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THE AUTOMOBILE

Vol. XXXV
No. 18

NEW YORK, NOVEMBER 2, 1916

Ten cents a copy
Three dollars a year

HUDSON SUPER SIX

Who Are the Two Most Successful Automobile Dealers in Your Territory?

Their names are on your lips as you read this. But why are they the leaders? Isn't it due to a combination of their merchandising abilities and especially to the cars they sell? The very best dealer cannot make a success with a car that is not wide and popularly known. The poorest dealer "gets by" with a good seller.

We are not seeking to carry inefficient dealers through to an unearned prosperity by assigning them valuable territory on the Hudson Super-Six.

Nor are we willing to long retain any dealer who does not keep up his share of the "Hudson Spirit" we have woven into our policies.

Hudson distributors and dealers are prosperous because it is not necessary for them to make unprofitable deals in order to find an outlet for Hudson cars.

If it is necessary to "SELL" every car you turn over, there is no profit in handling the line.

We require all our dealers to do their share in increasing the demand for Hudsons, by the character of their merchandising.

Wouldn't you like to know something of our methods?

They have made us the world's largest producers of fine cars. Some time we might have a proposition for you.

HUDSON MOTOR CAR COMPANY
DETROIT, MICHIGAN

HUDSON SUPER-SIX

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Stewart

Motor Driven Tire Pump

Every Car Needs One

The best cars are now equipped with the Stewart Tire Pump before they leave the factory.

But there are thousands of cars in every territory still unequipped.

Get this business. The Stewart Tire Pump is the best—and the least expensive.

It goes on any car. Installations will keep things moving in your shop.

It's a real money maker for dealers.

The Stewart-Warner Speedometer Corporation
Chicago, Ill., U. S. A.

$12

The AUTOMOBILE

VOL. XXXV NEW YORK—THURSDAY, NOVEMBER 2, 1916—CHICAGO No. 18

A. O. Smith Corp. Formed

Stock on Curb—Offers $3,000,000 Preferred and 100,000 Shares Common

NEW YORK CITY, Nov. 1—One more company has entered Wall Street activities by listing its stock on the Curb. Increased business, as in the majority of cases, has been the cause of the formation of a new company to accommodate further factory expansion. The A. O. Smith Corp. has just been formed to take over the entire plant, assets, business and good will of the A. O. Smith Co., Milwaukee, manufacturing pressed steel frames, pressed steel rear axle housings, heavy stampings and drop forgings. An offering of $3,000,000 7 per cent cumulative preferred and 100,000 shares of common is being made in Wall Street. W. P. Bonbright & Co., and White, Weld & Co., this city, and Elston & Co., Chicago, have purchased the entire issue of preferred and are offering it at 98 with the privilege of subscribing to 40 per cent in common at $35 a share.

Management Unchanged

The management of the company will remain unchanged under Raymond Smith, who is president and general manager and chief stockholder.

The old company has been in active operation since 1904, having succeeded to the business of the Federal Mfg. Co. Average net earnings of the company after full depreciation for the 5 years ended July 31, 1916, were $474,540; for the year ended July 31, 1916, $1,505,162, or more than seven times the new preferred dividend requirement of $210,000. Net earnings for the year to end July 31, 1917, are estimated at $1,800,000. Net assets of the new corporation will be in excess of 113 per cent and net quick assets in excess of 45 per cent of the preferred stock. The stock has a sinking fund of at least 20 per cent of net earnings after preferred dividends, commencing Oct. 1, 1917, which is to be applied to purchase and cancellation of the stock. No dividend in excess of $6 per share per annum can be paid on the common stock until the amount of the preferred has been reduced to $1,500,000.

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Chalmers Refinancing Under Way

NEW YORK CITY, Oct. 28—Plans for the refinancing of the Chalmers Motor Co., Detroit, are now being worked out by J. S. Bache & Co. and C. D. Barney & Co., both of this city. Though the details of the transaction have not been consummated, it is stated that the company will acquire an addition of more than $5,000,000 in working capital. It is expected that the plan will be announced in the near future.

—

Smalley Is Bound Brook Bearing V.-P.

BOUND BROOK, N. J., Oct. 30—George O. Smalley has been promoted to first vice-president and general manager of the Bound Brook Oil-less Bearing Co., succeeding the late Leigh S. Bache. Mr. Smalley has been connected with this company for 10 years and for the last 4 years as assistant general manager and assistant treasurer.

—

Railroad Car Shortage Grows

DETROIT, MICH., Oct. 30—The freight car shortage is now greater than was ever before experienced at this season of the year. On Sept. 30 there was a net shortage of 61,030 cars as compared with a surplus of 131,027 cars on Oct. 1, 1914 and of 78,299 on Oct. 1, 1915.

—

Disco Reduces Ford System $10

DETROIT, MICH., Oct. 28—The Disco Electric Starter Corp., this city, has reduced the price of its electric starting and lighting systems for Ford cars $10 to $65.

United Motors Adds Radiator Co.

Addition of Harrison Mfg. Co. Makes a Total of Eight Units

NEW YORK CITY, Oct. 31—The Harrison Mfg. Co., Lockport, N. Y., has been purchased by the United Motors Corp. The Harrison company manufactures radiators. The same policy will be followed with regard to the Harrison company as with the other concerns which the United Motors Corp. has taken over. The purchase of the Harrison company brings the total United Motors Corp. purchases up to eight companies, these being: Hyatt, New Departure, Delco, Remy, Perlman, Klaxon, Brown-Lipe-Chapin and Harrison.

The Harrison Mfg. Co. now becomes the Harrison Radiator Corp., and plans have been perfected to increase its present capacity of 350 radiators daily to 3000 per day. The corporation will make radiators for Chevrolet and other General Motors Co. subsidiaries.

The directors of the Harrison company have voted to keep the industry in Lockport and have secured options on all property adjacent to the plant on which a three-story factory will be built at once to cost $300,000. Further additions will follow. The company will employ about 700 men when the new facilities are available. It now has nearly 300 on its payroll. The enlarged factory capacity will be ready by March, 1917.

—

Michigan Wheel Co. to Make Joints

GRAND RAPIDS, MICH., Oct. 25—The Michigan Wheel Co. is floating an issue of $50,000 preferred stock in the company for the manufacture of an automobile joint about to be marketed. With the completion of the subscription joint manufacture will start immediately.

Emerson Buys Plant at Kingston

Materials, Engines and Parts Purchased for First Lot of 500 Cars

NEW YORK CITY, Oct. 30—The Emerson Motors Co. of this city, manufacturer of the Emerson four-cylinder car, deliveries of which are soon to start, has purchased a factory in Kingston, N. Y., where the car will be produced in quantities. The factory purchased last week is known as the Peckham plant. The deal for it was made with Almirall & Co. of this city. This factory when equipped will have capacity for 100 cars per day. There is a machine shop 424 by 70 ft., which is having an addition of 96 by 70 ft. built which is incorporated in the 424 by 70 dimensions. There is a main factory 487 by 224 ft., with a 2-in. plank floor, which will be used for assembly purposes; and in addition are four warehouses with floor area of 70,000 sq. ft. The power house is 60 by 40 and the office building 50 ft. square. At present there is no machinery in the plant. As soon as the floors are finished machinery will be installed, and T. A. Campbell, president of the company, says that much machinery has been purchased and will be installed as soon as the floors are ready.

In addition to this new plant the company has a factory in Long Island City of 18,000 sq. ft., where the first 110 cars will be built.

The Emerson company early in October placed its contract for the manufacture of 500 motors with an outside concern. These motors are to be all delivered by contract before Jan. 8. Deliveries on these motors will be starting in the near future. The company has already built ten cars, which have been running for test purposes.

That the Emerson company is prepared to go forward with its first lot of 500 is proven by the orders placed for other car components and the quantity of these at present on hand. Over 100 frames are already on hand and the other 400 on the way to the factory. The 500 bodies are at present well under way and will all be delivered by Dec. 20. Ninety axles are on hand and two carloads are in transit. All of the 500 will be delivered by Dec. 21. There are 100 gearsets and 300 sets of lamps on hand. Starters are to be coming through at fifty a week. There are 200 sets of springs on hand. The same stock of parts applies to many other minor components of the car.

To date the Emerson company has not signed with a single agent or allotted agents territory. No money has been accepted from agents as deposits for cars for agency rights. There are applications on hand from several thousand agents for territory, and allotment of territory will be started on Dec. 15.

There have been sold to date over 200 cars by direct sales to consumers. These have been sold at retail price with a cash deposit of 10 per cent. No specific delivery date has been given, but delivery will be by rotation in order of deposits. The cash deposited on these cars is held as a separate account and is deposited in one of the trust companies in Long Island City.

The finances of the company as of Oct. 1 are shown by the audit report of the American Audit Co. of this city, which shows liquid assets at that date of approximately $551,000. Cash on hand totaled $307,447 and securities $182,000.

—

Studebaker to Raise Prices Dec. 1

DETROIT, MICH., Oct. 28—The Studebaker Corp. will shortly announce an increase in the prices of its various models, to take effect on or about Dec. 1. The increase will be between $75 and $100 on each of its products.

—

Cole Prices to Advance Jan. 1.

INDIANAPOLIS, IND., Oct. 30—The Cole Motor Car Co., this city, will increase the price of its cars on Jan. 1, 1917, by $100 to $200. The present price of the Cole eight is $1,595.

—

Canadian Ford to Make Trucks

DETROIT, MICH., Oct. 28—The Ford Motor Co. of Canada, Ltd., will begin the manufacture of trucks in March, 1917.

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Berger and Thompson with Abbott

DETROIT, MICH., Oct. 25—Fred Berger has been appointed chief of the engineering department, and Alfred Thompson, factory and production manager of the Abbott Corp.

—

Schulz Is Mercer Chief Engineer

TRENTON, N. J., Oct. 29—A. C. Schulz has been appointed chief engineer of the Mercer Automobile Co., this city. Mr. Schulz was formerly connected with the Locomobile Co. of America in the capacity of assistant chief engineer. He was with Locomobile for 14 years.

—

Alford Vice-President of Nash

KENOSHA, WIS., Oct. 28—W. H. Alford, formerly Comptroller of the General Motors Co., has rejoined his old chief, C. W. Nash, as vice-president and comptroller of the Nash Motors Co.

—

White Empire Purchasing Agent

INDIANAPOLIS, IND., Oct. 30—E. E. White has been appointed purchasing agent of the Empire Automobile Co., this city. Mr. White has been associated with the Premier and American companies in this city.

Monroe Co. Increases Capital

Raises Stock from $250,000 to $1,000,000—R. F. Monroe Elected President

DETROIT, Oct. 27—The Monroe Motor Car Co., Pontiac, Mich., has increased its capital from $250,000 to $1,000,000. New officers were elected at a directors' meeting held Oct. 24, and include R. F. Monroe, president and general manager; S. W. McFarland, secretary and treasurer, and S. S. Jenks, vice-president and manufacturing manager. The board of directors is composed of R. F. Monroe, S. W. McFarland, S. S. Jenks and W. C. Rowles, Pontiac; L. E. Haase, general sales manager, and R. T. Armstrong of the Armstrong Mfg. Co., Flint, Mich. S. W. McFarland was formerly the secretary and treasurer and S. S. Jenks was the manager of the Port Huron Construction Co., Port Huron, Mich., which has now been purchased and absorbed by the Monroe Motor Car Co. Mr. McFarland is also cashier of the Port Huron Commercial Bank.

The company plans to utilize the Port Huron plant for the construction of motors until some time in the future, when the plant will be moved to Pontiac.

The Monroe company, which opened its plant in August, 1914, making its first delivery Jan. 1, 1915, has heretofore been selling its product through the Chevrolet company of Flint. It will sell its cars directly in the future. The company made 3500 small roadsters in the past year and plans to turn out approximately 7000 cars during the coming 12 months, which will include 2000 small roadsters with roadster, clover-leaf or sedan bodies and 5000 four-cylinder touring cars with either touring or clover-leaf bodies. Its prices will be $565 for its present roadsters, $635 for the clover-leaf roadsters, $965 for the sedan and $985 for the new touring cars with either touring or clover-leaf bodies.

—

Murphy Joins Hoyt Service

CLEVELAND, OHIO, Oct. 30—Gail Murphy has become manager of the local office of the Hoyt's Service, New York, advertising and sales management. For the past year Mr. Murphy has been advertising manager of the Chalmers Motor Co., Detroit. His headquarters are in the Leader-News Building.

—

Lane Is U. S. L. Vice-President

NIAGARA FALLS, N. Y., Oct. 28—At the recent meeting of the board of directors of the U. S. Light & Heat Corp., C. L. Lane, who has been secretary of the company, was elected vice-president.

Oct. Shipments 19,510 Carloads

Freight Car Shortage Hampers Manufacturers—License Case Argued in Washington

CARLOAD SHIPMENTS OF AUTOMOBILES

Month	1916	1915
January	18,054	8,369
February	21,502	11,273
March	28,600	16,442
April	28,000	17,112
May	24,000	13,642
June	23,879	15,325
July	18,079	12,517
August	18,254	16,959
September	21,660	18,940
October	19,510	17,848

NEW YORK CITY, Nov. 1—According to statistics submitted by the traffic department of the National Automobile Chamber of Commerce at the directors' meeting to-day there were 19,510 carloads of automobiles shipped during the month of October, with 1 day missing, as against 17,848 carloads for the same month last year. Shortage of freight cars continues in all lines of trade.

The commercial vehicle department reported that it was endeavoring to supply complete data to the lawmakers in various States in connection with proposed legislation governing the use of trucks on the highways, which will permit the special commissions and others to make recommendations for reasonable legislation which will not hamper the growth of the commercial vehicle industry.

Charles Clifton, president of the N. A. C. C., will act as national councillor representing the automobile manufacturers' organization in the Chamber of Commerce of the United States.

At Washington on Wednesday counsel for the N. A. C. C. argued the automobile license case before the Supreme court having to do with the constitutionality of the State registration law. The case is to decide whether the States have a right to raise funds for good roads work under the guise of registration fees and whether they can interfere with interstate traffic and require registration of a motor vehicle which has already complied with the registration laws of its home State.

In attendance at the meeting were: Charles Clifton, president, Pierce-Arrow; C. C. Hanch, Studebaker; Hugh Chalmers, Chalmers; R. D. Chapin, Hudson; William E. Metzger, Columbia; H. H. Rice, Waverley; Carl H. Pelton, Maxwell; Windsor T. White, White; A. L. Riker, Locomobile; R. E. Olds, Reo; John N. Willys, Willys-Overland; Alfred Reeves, general manager, and S. A. Miles.

—

48,750 Studebakers Built by Canadian Company

WALKERVILLE, ONT., Oct. 28—For the first 8 months in 1916, sales of Studebaker cars exceeded the record for the entire year of 1915, according to figures just announced by J. E. Grady, sales manager of the Studebaker Corp. of Canada, Ltd., Walkerville.

In number, the cars, 48,750 Studebakers were sold from Jan. 1 to Aug. 31 of this year, as compared with 47,040 for the whole of last year, a gain of 1710.

At the present rate 1916 sales will be 55.4 per cent greater than in 1915, or 73,125 cars this year compared with 47,040 last year, a gain of 26,085. As a matter of fact, however, the balance in favor of 1916 over 1915 will be greater than the estimate just given, for the Studebaker output is being steadily increased and the sales for the last 4 months of this year promise to be larger in proportion than for the first 8 months of the year.

Sept. Exports Lower Than in 1915

Though Number of Cars and Trucks Falls Off, Value Is Slightly Higher

WASHINGTON, D. C., Oct. 30—There was a pronounced falling off in the exports of automobiles in September last as compared with the same month of last year, according to the returns of the Department of Commerce, announced to-day. The exports in September last were as follows: Commercial cars, 1835, valued at $5,203,215; passenger cars, 3585, valued at $2,819,405. For the same month of last year the exports were: commercial cars, 2227, valued at $5,882,255; passenger cars, 4299, valued at $3,215,459. The gain during the month was in the exports of parts, not including engines and tires, which rose in value from $1,613,419, in September a year ago to $2,095,188, in September last.

Detailed statistics for the various countries appear in the table.

Fewer Trucks Shipped

Taking the figures for the 9 months' period, ended September, there is a distinct loss in the exports of commercial cars, for this year's period, due to the curtailment of war orders, while passenger car exports show a tremendous gain. The figures show that during the 9 months ended September, 1915, there were 17,269 commercial cars, valued at $47,769,216, shipped abroad, as against 14,773 cars, valued at $40,371,055, exported during the same period of this year. Passenger car exports during the 1915 period amounted to 31,036 cars, valued at $26,793,972, while during the

(*Continued on page* 737)

Exports of Automobiles, Trucks and Parts for September and 9 Previous Months

	September				9 Months Ending September			
	1915		1916		1915		1916	
	Number	Value	Number	Value	Number	Value	Number	Value
Passenger cars	4,299	$3,215,459	3,585	$2,819,405	31,036	$26,793,972	47,246	$32,291,633
Commercial cars	2,227	5,882,255	1,835	5,203,215	17,269	47,769,216	14,773	40,371,055
Parts, not including engines and tires	.....	1,613,419	.....	2,095,188	.....	10,994,859	.....	17,322,349
	6,526	$10,711,133	5,420	$10,117,808	48,305	$85,558,047	62,019	$89,985,037
By Countries								
Denmark	.....	.....	177	$139,301	.....	.....	936	$714,412
France	421	$916,830	653	1,523,761	4,885	$12,126,628	6,497	16,529,055
Germany	.....	.....	.....	.....	4	2,801	.....	.....
Italy	49	34,516	5	3,500	170	109,014	237	143,967
Russia	.....	.....	670	1,957,287	.....	.....	2,852	7,912,407
United Kingdom	2,650	3,119,806	700	1,684,579	19,434	28,648,749	7,275	12,076,838
Other Europe	1,144	3,341,676	248	232,579	6,688	18,082,964	3,102	3,867,419
Canada	367	278,382	621	528,461	5,049	3,951,585	10,097	7,306,117
Mexico	5	4,160	44	33,239	75	71,891	410	373,887
West Indies and Bermuda	286	194,832	242	207,710	2,358	1,305,005	4,039	2,647,191
South America	595	273,449	.....	.....	2,081	1,066,486	.....	.....
Argentina	.....	.....	158	147,572	.....	.....	3,956	2,011,197
Brazil	.....	.....	24	15,367	.....	.....	304	199,814
Chile	.....	.....	178	107,241	.....	.....	880	554,029
Venezuela	.....	.....	25	19,553	.....	.....	411	260,535
Other South America	.....	.....	94	77,132	.....	.....	703	444,891
British East Indies	.....	.....	323	210,093	.....	.....	3,101	2,284,246
Australia	.....	.....	428	338,286	.....	.....	6,678	5,086,981
British Oceania	387	312,856	.....	.....	3,147	2,681,592	.....	.....
Asia and other Oceania	442	486,757	731	565,448	2,950	5,189,938	6,807	7,995,846
Other countries	180	134,450	308	231,511	1,464	1,326,536	3,707	2,253,856
	6,526	$9,097,714	5,629	$8,022,620	48,305	$74,563,189	61,992	$72,662,688

Marmon Co. Rushes Additions

Assembly Plant To Be Further Enlarged — Improved Power Facilities

INDIANAPOLIS, IND., Oct. 30—The Nordyke & Marmon Co. is steadily adding buildings and making improvements to its plant in order to take care of the increasing demand for the Marmon 34. Last winter the company felt the pinch of room and erected a large final assembly building 100 by 400 ft. on a plot of ground across the street from the main plant. Building operations are being rapidly pushed at the present time to add some 500 ft. to this building so that when it is completed it will be a structure almost 900 ft. long by 100 ft. wide. In addition a large capacity heating and power plant will also be erected.

Considerable improvements are also being made on the original factory plot by an additional two new buildings center of the plant including a new blacksmith's shop with several thousand feet of floorspace and a new experimental building which will contain about 4000 ft. of floor space.

New loading and unloading docks with additional railroad siding facilities are also being completed and additional shipping docks for wagon freight have been erected.

An interesting feature of these changes is the passing of the old brick stable for horses which has been a part of Nordyke & Marmon Co.'s plant for almost 2 decades. Automobile and motor trucks have almost wholly taken the place for hauling and the stable of olden days has been converted into a new employment office and factory doctor's headquarters.

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Dodge to Build Additional Factory

DETROIT, MICH., Oct. 28—Permit has been given to Dodge Bros. for erection of an additional factory to cost $300,000. The building will be used as a warehouse and will be 310 by 118 ft.

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Alvin Heads Schoeneck Co.

CHICAGO, ILL., Oct. 30—F. J. Alvin has become president and general manager of the Schoeneck Co., this city and Harvey, Ill., maker of the Geneva six. This company was recently formed with a capital of $1,500,000 to build the car designed by George Schoeneck, well known in the automobile field and connected with such concerns as Renault and Palmer & Singer.

Mr. Alvin was at one time connected with the American Ever-Ready Co. He then formed the National Sales Corp. in this city, which controlled the entire factory output and sales of the Schebler carbureter, Dow magnet, Kingston coils, etc. Later he took entire charge of the business of the Byrne-Kingston Co., Kokomo, Ind., in Detroit, and later became sales manager of the Sears-Cross Co. In 1915 he formed the New Era Engineering Co. to manufacture the New Era car at Joliet.

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Pontiac Plant for Olympian Motors

PONTIAC, MICH., Oct. 30—The Olympian Motors Co. will permanently locate its plant in this city. The company is incorporated under the laws of Delaware for $1,000,000, all of the stock being common with a par value of $100 per share. The company takes over the business of the Pontiac Chassis Co., which has been manufacturing chassis for the market in large quantities for some time. From 12,000 to 15,000 cars will be built annually.

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Empire Axle Plans Large 1917 Production

DUNKIRK, N. Y., Oct. 30—That the automobile and truck axle manufacturing companies are sharing in the general prosperity of the country is manifested in a statement made by the Empire Axle Co. that it will put out as many axles in the first 4 months of the coming year as it did in the whole year of 1916. It has increased its daily capacity in worm drive axles more than 400 per cent over that of a year ago.

Increased demand and production necessitated an increase during the year of 54,600 sq. ft. in its factory space, centered mainly on three new buildings, 85 by 110; 30 by 50; and 85 by 100. The first building is being used as an assembly plant, tool making and some machine work; the second is an addition to the assembly plant, used as a forge shop; the third is not yet built, but will be used for the machining of castings, etc. Preparations are also being made for an office building separate from the factories.

Keeping in line with the general improvement in working conditions in the modern factory, the company has made several important installations to its plant. Scientific sanitary facilities for its employees in the way of steel lockers, shower baths, and special lavatories have been added; also bulletin boards displaying new safety-first ideas, safety appliances and guards on all machinery and many other improvements.

The gradual increase in its business has made necessary two shifts throughout the plant. The heat treating department has been operating night and day for the last 6 months. The power plant has not been idle for more than 1 hr. at a time with the exception of holidays, since May, 1915.

Franklin To Increase Production

Company Has Added Six New Buildings This Year at a Cost of $1,000,000

SYRACUSE, N. Y., Oct. 25—Factory expansion this year by the H. H. Franklin Mfg. Co., this city, has been centered in six new buildings, giving an additional factory space of approximately 550,000 sq. ft. at a total cost of over $1,000,000. These increased manufacturing facilities are at present enabling the company to produce twenty-seven cars per day, as compared with eleven per day a year ago. Within the next 6 months the company will produce forty cars per day. Between Oct. 30, 1915, and Oct. 2, 1916, the production force has changed from 1215 to 2133.

The development that has taken place in the enlargement of factory space this year has been in a one-story building, 154 by 160, costing $40,000, used for the experimental department, chassis testing and the sawmill; a three-story building, 60 by 100, costing $30,000, for die casting; a six-story building, 108 by 265, costing $250,000, for manufacturing; an employment office and hospital, costing $4,000; a building for lumber drying, costing $6,000, and a six-story, 240 by 300 structure now being built at a cost of $500,000 for shipping and manufacturing.

Better Factory Methods

Improvements have taken place in the methods of manufacture and in the handling of the employees. Among its major improvements in manufacturing methods are the complete development of humidified oven drying apparatus for the paint department, completely eliminating the use of the old style of brush in the paint shop except in the last coat of varnish; pneumatic methods of drilling cap screw and nut driving, as well as wood screw driving. To thoroughly provide safety for its employees a safety man, who was formerly in charge of the first-aid room, is taking care of the safety devices. During the year the company has designed and put into use an entirely new set of manufacturing tools, costing approximately $300,000.

Workmen Rated

Probably not the least important in the changes during the year is the new method of rating workmen and supervisors, up to and including the foremen, which has resulted so far in the increase in wages of 5½ cents average per man since April, 1916, applying to approximately 25 per cent of the entire working force of the factory.

Surplus of 2-In. Maple

Uncertainty of Steel Deliveries May Affect Sales to Body Builders

ST. LOUIS, MO., Oct. 30—For the first time in 5 months there is a surplus of 2-in. maple offered in the hardwood market here. Maple of 2 in. and thicker is used almost exclusively by automobile builders for frames on which to build the metal sides of the bodies. The maple is to-day quoted at $27 per 1000 ft. at the mill, or at about $35 at most of the automobile factories. There is considerable speculation here among hardwood men as to why this accumulation while the automobile industry is forging ahead so rapidly. There are two explanations: First, the automobile builders are not buying far ahead because they are uncertain as to the steel deliveries; second, the rapid advance of maple last spring and a scarcity for a time persuaded the mills to cut more than is needed. The figures in the hands of the local sawmill men do not bear out the latter theory.

St. Louis a Center

A very large proportion of the maple used by the automobile industry is sold in this city, which is one of the great hardwood markets of the country. It is the largest hardwood reshipping point, there being half a dozen large reshipping yards here and a dozen small ones. These yards buy hardwoods from small yards throughout this section and the South, and regrade the lumber here and then reship it. Most of the maple produced in this country comes from Missouri and Arkansas, and the Missouri cut is estimated at 4,000,000 ft. The Arkansas cut is smaller. Maple is only an incidental part of the output of mills, probably the largest output being that of the Gideon-Anderson mill at Gideon, Mo., with sales offices here. The output of this mill is about 750,000 ft. a year, while the mill cuts more than 100,000 ft. daily of all hardwoods. From 250 to 500 ft. of lumber is required for an automobile.

Before the automobile industry came into being, maple was used chiefly by furniture makers and was then not cut more than 1½ in. thick and sold on a mill basis of about $15 per 1000 ft. At first ash was used for automobile body frames, but when it mounted to $50 per 1000 ft. a substitute was sought and was found in maple. In the 4 years since this use of maple began the price has advanced about $9 per 1000 ft.

Gum Widely Used

Last spring there was a pronounced scarcity of maple and for a short time there was considerable bidding for it; but the builders of lower-priced machines turned to gum and relieved the pressure. Some of the gum used for automobiles is sold through this city, but a greater portion is sold through Memphis. One-inch gum has for a long time been used by automobile builders for floors, etc. Yellow pine, which is sold chiefly through this city and Kansas City, is used for crating.

—

Wagon Makers to Merge and Build Motor Vehicles

CINCINNATI, OHIO, Oct. 30—Steps have been taken by almost a score of wagon manufacturers of this city for the merging of their interests into a large concern for the manufacture of both horse-drawn and motor-driven wagons, to be used for all purposes. A preliminary meeting was held Oct. 28, when the project was discussed and Attorney Emil Hauch was instructed to draw up the articles of incorporation for a $500,000 concern.

It is planned to erect a large central plant and use a number of the existing plants as branches. Some of the present plants will be abandoned entirely. Among those interested in the movement are Fred Dhonau, Jr., president of the F. Dhonau Son's Co.; L. J. Froelicher of A. Froelicher Sons Co., Michael Klopp of Philip Klopp & Sons, George Finn of the J. Finn Sons Co., J. H. Lewis, H. Burdorf and Harry W. Monning, individual manufacturers.

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Goodyear Secures Cotton Plantation

PHOENIX, ARIZ., Nov. 1—In order to obtain a fixed supply of long staple Egyptian cotton, the Goodyear Tire & Rubber Co., Akron, Ohio, has purchased 10,000 acres of land in the Salt River valley, and will at once embark in the business of cotton raising on a large scale.

It is reported that the Goodyear company is also planning to increase this acreage by leasing from 20,000 to 25,000 acres additional, leases to run for 5 years. Contracts to supply the Goodyear company with long staple cotton have been awarded the operating corporation, on long-term contracts.

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American Chain Co. Buys Standard

BRIDGEPORT, CONN., Oct. 28—The American Chain Co., manufacturer of Weed tire chains in this city, has purchased the Standard Chain Co., Pittsburgh, Pa. Announcement of the acquisition of the Standard company was made at a dinner given to the distributors of Weed chains by the American Chain Co.

Plans for combining the sales organizations and part of the office force of the two companies are in preparation and will probably be put into effect by Jan. 1.

Welfare Work at Remy Plant

Special Bldg. for Women Employees—Co-operates in Teaching Electricity

ANDERSON, IND., Oct. 30—The extensive construction work that is under way at the plant of the Remy Electric Co., Anderson, is not concerned entirely with increasing the production of the various units. A part of the building activity is directed at co-operative welfare work with the employees.

Ground has just been broken by the company for a two-story building designed solely for the many women employees. The new building will be devoted to the manufacture of small parts of its products at the making of which women are particularly adept. The structure will contain every convenience for the transfer of work so no lifting need be done, the interiors will be painted white and there will be rest rooms.

The Remy company is working in co-operation with a local high school in the teaching of the elements of electricity. The school has a membership of 400, meets 3 nights a week and gives Remy employees, young men and women in the local high school and anyone else interested the opportunity of securing a practical training in electricity. The Remy company furnishes text-books at cost and pays the salary of the instructor.

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Pa. Rubber Establishes Sales Districts

JEANNETTE, PA., Oct. 31—The Pennsylvania Rubber Co., this city, will establish districts under sales directors in order to give closer attention to the various sections of the country. This does not mean that the whole branch system has been abolished, but merely that the branches will now come under certain districts and sales directors as follows: Eastern territory, C. C. McCullough; southern district, D. D. F. Yard; central States, J. Q. Goudie; the west, C. F. Kent; and the Pacific Coast, J. F. Madden. Vice-President C. M. DuPuy will continue in charge of the Pennsylvania district.

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Holt-Welles Co. Elects Officers

NEW YORK CITY, Oct. 28—At the recent annual meeting of the stockholders of the Holt-Welles Co., Inc., New York, manufacturer of the Branford and Browne carbureters, the following officers were elected for the ensuing year: E. H. Stickels, president; F. E. Hamilton, vice-president and counsel; Calvert Holt, treasurer; Paul Welles, secretary; Wm. M. Williams, assistant treasurer and secretary.

U. S. A. Cars Gain in Chile

Value of Shipments Jumps from $44,169 to $202,-498 in Year

SANTIAGO, CHILE, Oct. 18—That the American automobile industry is fast getting a foothold in Chile is manifested in the fact that U. S. A. shipments to that country increased from $44,169 to $202,498 from 1913 to 1915. Though there was a slight decline in automobile imports as a whole during 1915, and Chile's purchases of foreign automobiles declined considerably, the American car's popularity held strong with much larger sales.

That the automobile is popular in Chile is proved in a comparison of its imports from 1908, 1909 and 1910, which were $14,054, $11,760 and $26,971, respectively. At present there are about 1300 cars in this city, between 300 and 400 of them being used as taxicabs at a charge of $1.10 in U. S. gold, or about 22 cents a trip.

Poor road conditions will not allow of many trips outside of this city, and as a result the most popular cars for private use are broughams, limousines, and landaulets. Black and dark blue cars should be sent only on special order. The prospect of better roads is not particularly encouraging, although there is some talk of building one between Santiago and Valparaiso. In such a case there should be an increased demand for touring cars.

Two-seated runabouts are not common, and when seen generally have a small seat behind for the chauffeur. This is demanded by custom, for even though the owner of the car is driving he must always have the chauffeur with him in case of need. American runabouts with a third seat behind, which could be folded into the body when not in use, thus giving the car a smarter appearance, should find a market.

Trucks are not used to any extent in the central and southern part of the country and the low cost of hauling by oxcart and wagon would limit their introduction. In the nitrate fields, however, they have begun to be used with good results.

The maximum price for gasoline during the past few months was $5.45 per case of two 5-gal. tins, which is the method of handling used here.

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New Zealand a Fertile Field for Automobile Sales

AUCKLAND, NEW ZEALAND, Oct. 20—If we judge a country from its export trade then New Zealand must be put in the prosperity column, for its exports have increased 30 per cent in the last year. These islands are the most fertile areas in the world and naturally good automobile markets. The European war, and increased demand for foreign products, account for the present prosperity.

U. S. Leads in Imports

As a consumer of automobiles, motorcycles, etc., New Zealand imported in 1915, $6,889,893. The United States lead all of the countries in supplying this demand. The value of cars imported from the U. S. A. was $1,842,948, whereas the value supplied by the United Kingdom was $1,612,671.

An indication of how New Zealand profited by the war is that wool, which is the greatest product, increased 22½ per cent in value; frozen meats, which constitute the second greatest article of export, increased 30 per cent; butter in fourth position as an export, rose 20 per cent; cheese rose 30 per cent in value: and other export articles increased similarly.

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Perlman Stock on Exchange Basis

NEW YORK CITY, Oct. 30—L. G. Kaufman and W. C. Durant have caused to be sent to the Perlman Rim Corp. stockholders notice that on presentation of their Guaranty Trust Co. receipts, United Motors Corp. stock will be issued forthwith. It was agreed that this release would be made on Nov. 25, but it is decided to grant the release at once.

Daily Market Reports for the Past Week

Material	Tues.	Wed.	Thur.	Fri.	Sat.	Mon.	Week's Ch'ge
Aluminum, lb.	.65	.65	.65	.65	.65	.65	...
Antimony, lb.	.13	.13	.13	.13	.13	.13	...
Beams and Channels, 100 lb.	2.88	2.97	2.97	2.97	2.97	2.97	+ .09
Bessemer Steel, ton	45.00	45.00	45.00	50.00	50.00	50.00	+5.00
Copper, Elec., lb.	.28½	.28½	.28½	.28½	.28½	.28½	...
Copper, Lake, lb.	.28½	.28½	.28½	.28½	.28½	.28½	...
Cottonseed Oil, bbl.	12.50	12.15	12.50	12.61	12.70	12.47	— .03
Fish Oil, Menhaden, Brown, gal.	.60	.60	.60	.60	.60	.60	...
Gasoline, Auto, bbl.	.22	.22	.22	.22	.22	.22	...
Lard Oil, prime, gal.	1.10	1.10	1.10	1.10	1.10	1.25	+ .15
Lead, 100 lb.	7.05	7.05	7.05	7.05	7.05	7.05	...
Linseed Oil, gal.	.88	.88	.88	.88	.88	.90	+ .02
Open-Hearth Steel, ton	45.00	45.00	45.00	50.00	50.00	50.00	+5.00
Petroleum, bbl., Kans., crude	.90	.90	.90	.90	.90	.90	...
Petroleum, bbl., Pa., crude	2.60	2.60	2.60	2.60	2.60	2.60	...
Rapeseed Oil, refined, gal.	.95	.95	.95	.95	.95	.95	...
Rubber, Fine Up-River, Para, lb.	.75	.77	.77	.80	.80	.81½	+ .06½
Rubber, Ceylon, First Latex, lb.	.61	.62	.62	.63	.63½	.63½	+ .02½
Sulphuric Acid, 60 Baume, gal.	1.50	1.50	1.50	1.50	1.50	1.50	...
Tin, 100 lb.	41.25	41.63	41.63	42.00	42.00	42.00	+ .75
Tire Scrap, lb.	.06	.06	.06	.06	.06	.06	...

Metal Prices Are Higher

Rise in All Steel Quotations Also Extends to Rubber and Other Materials

NEW YORK CITY, Oct. 31—Metal prices featured last week's market activities with a general rise in all departments. Bessemer and open-hearth steel reached $50.00 per ton at a gain of $5.00; beams and channels rose 9 cents per 100 lb. to $2.97; and tin rose 75 cents per 100 lb. to $42.00. Rubber prices have also followed suit with the metals with a large rise. Fine up-river Para is now quoting at 81½ cents a pound, just 6½ cents higher than a week ago; Ceylon is 2½ cents higher a pound at 63½. Rubber from the Dutch East Indies is now in the midst of a boom and its production there is increasing by leaps and bounds. According to authoritative statements, the crop harvested last year in the island of Java alone was 6,059,098 kilograms, as against 3,260,274 in 1914, and it is estimated at as much as 9,205,825 kilograms in the current year.

Drought in Brazil

In regard to the rise in Para rubber, it may be explained as due to a drought in the Amazon region of Brazil. The water is so low in the tributaries of the Amazon that many steamers are lying at Para and Manaos, loaded with provisions for the rubber country, but unable to get there. By the same token, the rubber-laden up-river ships cannot get down.

Fuel prices remained constant last week. Gasoline prices in some sections of the country have gone down with no prospects of a sustained decline. Crude oil prices are still quoting at their record quotations. The high prices of crude oil have indirectly brought the price of gasoline down, at any rate, have eased the tension on quotations. Before crude prices rose, it was stated that refiners found it impossible to get the required quantity of different grades.

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Parts Companies Add Capital

CONNERSVILLE, IND., Oct. 30—The Metal Auto Parts Co. has increased its capital from $50,000 to $150,000.

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PERU, IND., Oct. 30—The Peru Auto Parts Mfg. Co. has increased capitalization from $200,000 to $500,000.

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Punctureless Tire to Increase Capital

AKRON, OHIO, Oct. 25—In order to take care of factory expansion the Punctureless Auto Tire Co., this city, has called a meeting of the stockholders

for Dec. 25 to vote on an increase in capitalization from $100,000 to $1,000,000. An additional five-story building will be erected. A plant is now being operated at Kenmore. Twenty-five men are employed and the working force will be increased to 100 within a month. The company is also operating a plant at Millersburg. Within 6 months the company will be turning out 500 tires daily, according to present plans and in consideration of the increased factory facilities which will be available.

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Auto Wheel Increases Capital $200,000

DETROIT, MICH., Oct. 28—The Auto Wheel Co., Lansing, Mich., has increased its common stock capitalization from $300,000 to $500,000. The issue was authorized by the directors at the annual meeting of the board on Oct. 24. The funds derived from the increase will be devoted to new buildings to care for increased business. Officers of the company remain the same and include E. S. Porter, president; H. E. Bradner, vice-president; D. L. Porter, secretary and treasurer, and John Winters, superintendent.

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Billings & Spencer to Expand

HARTFORD, CONN., Oct. 28—Shareholders of the Billings & Spencer Co. have authorized the issue of 10,000 shares of stock and holders of record last Saturday have the privilege of subscribing for 10,000 shares of unissued stock at par, $25 per share, on or before Nov. 18 at the rate of one new share for every two shares now held.

Slump in Security Prices

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Bearish Market Results in Drops of from a Fraction to 30 Points

NEW YORK CITY, Oct. 31—Automobile and accessory issues last week were in the hands of the bears who are at last realizing much profit on a down market. Chevrolet, General Motors and United Motors were especially low as a result of much selling pressure. Chevrolet dropped 11 points during the week, reaching 186; General Motors dropped to 800, a loss of 30 points; and United Motors to 62½, a loss of 4⅛ points. The latter stock has been very active on both sales and buys. The automobile securities have been a big puzzle to investors and speculators during the last month on account of their failure to make any material gains. When news of the submarine activities was flashed on the ticker recently the stocks held strong with few losses. Now with no apparent cause they are quoting low.

Some Liquidation

Of course liquidation of stock has lowered prices to some extent, as in Lee Rubber. This stock reached 39, the lowest price at which the stock has ever sold, notwithstanding the earning of its present $3 dividend in the first 6 months of the year. Maxwell has fluctuated during the past 2 weeks, recording fractional gains last week and dropping badly this week. Willys-Overland common, after recording a fractional gain the previous week, dropped 3⅜ points.

Several of the issues, however, showed considerable strength as a result of important announcements. Chalmers common and preferred rose 15 and 8 points, respectively. This company, it is stated, is considering a plan for fresh financing in which an addition of more than $5,000,000 working capital will be used for expansion.

Spicer Strong

Spicer preferred, a new stock on the Curb, picked up 2¼ points. All the $1,500,000 first preferred 8 per cent cumulative and convertible stock of this company has been sold.

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Dividends Declared

B. F. Goodrich Co., quarterly of $1.75 per share on preferred, payable Jan. 2, 1917, to stock of record Dec. 21, 1916; and regular quarterly of $1 per share on common stock, payable Feb. 15, 1917, to stock of record Feb. 2, 1917.

Yale & Towne Mfg. Co., extra of 5 per cent, payable Nov. 10 to stock of record Nov. 3.

Lee Rubber & Tire Co., quarterly of 50 cents a share and usual extra dividend of 25 cents a share, payable Dec. 1 to stock of record Nov. 15.

Westinghouse Electric & Mfg. Co., quarterly of 1½ per cent, 75 per cent per share on common for quarter ending Sept. 30, will be paid Oct. 31, to stock of record as of Oct. 6.

Automobile Securities Quotations on the New York and Detroit Exchanges

	Bid	Asked	Wks. Ch'ge
Ajax Rubber Co.	66⅛	66½	+3⅛
J. I. Case T. M. Co. pfd.	86	88	+1⅝
Chalmers Motor Co. com.	115	130	+15
Chalmers Motor Co. pfd.	98	100	+8
*Chandler Motor Car Co.	104	105	—2
Chevrolet Motor Co.	186	192	—11
Fisher Body Corp.	38	41	—1
Fisk Rubber Co. com.	..	93	..
Fisk Rubber Co. 1st pfd.	108	114	—2
Fisk Rubber Co. 2d pfd.	100	105	..
Firestone Tire & Rubber Co. com.	1145	1152	+15
Firestone Tire & Rubber Co. pfd.	110	112	..
*General Motors Co. com.	800	850	—30
*General Motors Co. pfd.	126	126⅛	— ⅛
*B. F. Goodrich Co. com.	72½	72⅞	—1⅝
*B. F. Goodrich Co. pfd.	112	114	—2⅛
Goodyear Tire & Rubber Co. com.	296	298	..
Goodyear Tire & Rubber Co. pfd.	108½	109½	+ ⅛
Grant Motor Car Corp.	8	9	..
Hupp Motor Car Corp. com.	5¼	5¾	+ ¼
Hupp Motor Car Corp. pfd.	92	100	+2
International Motor Co. com.	5	7	+ ½
International Motor Co. pfd.	20	30	+3
*Kelly-Springfield Tire Co. com.	75	76	+3¾
*Kelly-Springfield Tire Co. 1st pfd.	97	100	+1
*Lee Rubber & Tire Corp.	40½	40¾	—2¼
*Maxwell Motor Co. com.	85½	85¾	—4¼
*Maxwell Motor Co. 1st pfd.	85½	87	—1½
*Maxwell Motor Co. 2d pfd.	55	55⅛	— ½
Miller Rubber Co. com.	..	251	..
Miller Rubber Co. pfd.	105	107	..
Packard Motor Car Co. com.	170	180	..
Packard Motor Car Co. pfd.	94	99	—1
Paige-Detroit Motor Car Co.	42	45	+5¼
Peerless Truck & Motor Corp.	22	24	—2
Portage Rubber Co. com.	170	172	—4
Portage Rubber Co. pfd.	170	172	—3
Regal Motor Car Co. pfd.	23	30	+6
Reo Motor Car Co.	46	46¾	+2¾
Saxon Motor Car Corp.	77½	80	—2½
Spicer Mfg. Co.	103¾	104	+2¼
Springfield Body Corp. com.	95	100	+3
Springfield Body Corp. pfd.	120	130	..
Standard Motor Construction Co.	7½	8½	..
Stewart Warner Speed. Corp. com.	111½	†112	—1½
Stewart Warner Speed. Corp. pfd.	..	..	..
*Studebaker Corp. com.	129⅝	130	—5⅜
*Studebaker Corp. pfd.	110½	112	— ½
Stutz Motor	66	67	—2
Swinehart Tire & Rubber Co.	90	92	+4
United Motors Corp.	62½	62¾	—4⅛
*U. S. Rubber Co. com.	59	60	—2
*U. S. Rubber Co. pfd.	110	110¾	—1½
White Motor Co.	54½	55½	—2½
*Willys-Overland Co. com.	42¾	43	—3⅜
*Willys-Overland Co. pfd.	102½	103½	— ½

*At close Oct. 30, 1916, Listed New York Stock Exchange. †Ex-dividend.
Quotations by John Burnham & Co.

OFFICIAL QUOTATIONS OF THE DETROIT STOCK EXCHANGE

ACTIVE STOCKS

	Bid	Asked	Wks. Ch'ge
Auto Body Co.	42¾	..	+1¾
Chalmers Motor Co. com.	120	..	+20
Chalmers Motor Co. pfd.	98	..	+8
Continental Motor Co. com.	38¼	39¼	+2¼
Continental Motor Co. pfd.	9½	10½	..
Ford Motor Co. of Canada	285	305	+15
General Motors Co. com.	800	889	+25
General Motors Co. pfd.	124½	127½	+1½
Maxwell Motor Co. com.	87	90	+3
Maxwell Motor Co. 1st pfd.	85½	88½	— ½
Maxwell Motor Co. 2d pfd.	54	57	—1
Packard Motor Car Co. com.	..	177	..
Packard Motor Car Co. pfd.	100	101½	..
Paige-Detroit Motor Car Co.	41	42	+5
W. K. Prudden Co.	49	51	+1
Reo Motor Car Co.	46	47	+2½
Studebaker Corp. com.	132	135	—2½
Studebaker Corp. pfd.	109	..	..
C. M. Hall Lamp Co.	28½	31	..

INACTIVE STOCKS

Atlas Drop Forge Co.	..	33	..
Kelsey Wheel Co.	55	60	..
Regal Motor Car Co. pfd.	18	..	..

Gryphon Tire Co. To Expand

$221,000 in 7 Per Cent. Cumulative Preferred To Be Marketed

NEW YORK CITY, Oct. 25—The Gryphon Rubber & Tire Corp., this city, in order to take care of expansion, is offering through Boughton & Co., this city, $221,000 in 7 per cent cumulative preferred stock. Ten shares of preferred, $100 par, and two shares of common, $100 par, are being offered for $1,000. Gross earnings are estimated at $1,856,280.40. Operating expenses, including taxes, etc., are placed at $1,312,279.80, giving a surplus applicable to dividends of $544,000. The company's factory is now fully equipped and will be turning out 300 tires a day by Dec. 1.

This company was formed in 1915 to manufacture a tire manufactured extensively throughout Europe, the patentee being I. S. McGiehan of London, England. The American patent is No. 1,110,451, filed May 15, 1911. The tire is composed of a fabric carcass or foundation and a tread portion composed of layers of rubber-filled fabric of different widths formed into a crescent band, united thereto by an interposed film of softer rubber, all homogeneously vulcanized.

The company is capitalized with $650,000 common and $350,000 preferred. The directorate includes S. A. Cunningham, president of the Bankers Safe Deposit Co.; C. W. Hunt, secretary of the American Society of Civil Engineers; J. W. Jones, president of the Jones Speedometer Co.; P. S. Jones; R. M. Owen, president of the R. M. Owen Co.; N. W. Peters; H. W. Schuette; H. A. Weatherbee, president of Arnold, Constable & Co., and D. W. Whipple.

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Amazon Tire Enlarges Plant

AKRON, OHIO, Oct. 28—The Amazon Tire & Rubber Company, Akron, Ohio, have found it necessary to increase its floorspace. The factory is at present turning out about forty-five tires a day, and when the new four-story brick building is completed the production will average 300 tires daily. The company is building a standard tire with an extra side wall breaker strip, or blowout protection, added.

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New Plant for Racine Tire

RACINE, WIS., Oct. 28—The Racine Auto Tire, Racine, Wis., organized 7 years ago to manufacture tires, tubes and rubber goods, will undertake the construction and equipment of a large new plant during the winter months to enable it to handle the fast growing volume of business. The present quarters at Fourteenth and Clark Streets have been overcrowded for many months, but not until this week was it possible for the company to purchase a desirable site. A deal was closed for the 4-acre tract on North High Street and the Chicago & North-Western tracks, known as Racine Baseball park, and approximately $100,000 will be expended in the erection of a group of new buildings. When this is completed, the present force of 125 workmen will be doubled, and the production of 250 tires and tubes per day increased to 600 of each. Plans for the factory will be prepared early in November, and contracts awarded, so that occupancy can be taken on or before July 1, 1917.

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Tire Plant for Toronto

NEW YORK CITY, Oct. 27—A factory in which pneumatic tires of both the fabric and the cord type will be made has just started to operate in Toronto. This is owned by the van der Linde Rubber Co. and is backed by several men who have been interested in the Canadian developments of Bakelite by the firm of Plastics, Ltd. It is understood that the two concerns will work together although they will have separate financial organizations. Deliveries of tires are due to commence about the middle of January and only the fabric type will be made at first.

The company has a new design of cord tire in which the threads are arranged almost radially instead of at the considerable angle customary in cord tire construction. This is claimed to give the casing a greater strength and also to increase its resiliency from 2 to 5 per cent. A special form of tube is being made of red rubber treated so that there is little tendency for it to split should a blowout occur. It is stated that in the event of the shoe failing the damage to the tube is confined to the same size as, or smaller than, the hole in the casing, this making it easier to repair the tube.

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Gillette Tire to Operate Dec. 1

EAU CLAIRE, WIS., Oct. 28—The Gillette Safety Tire Co., Eau Claire, Wis., will not be able to commence operations in its new plant until Dec. 1, because labor troubles at Akron, Ohio, have delayed the completion of the extensive factory and equipment. The original plan was to be ready to start production July 1, and the date then was deferred to Oct. 1, but further delays were encountered in getting the equipment. The buildings are completed and ready for the installation of machinery, which will begin shortly after Nov. 1, according to assurances received by the company.

Bradley on Italian Front

The Automobile Correspondent Doing Ambulance Work—Studies Trucks

NEW YORK CITY, Oct. 31—W. F. Bradley, European correspondent for THE AUTOMOBILE, is now doing ambulance work with the British ambulance unit on the Italian front where he has been for several months and where he will be for several months to come. Mr. Bradley is making a very close study of motor truck use in all stages of army work on the Italian front and is very close in touch with transportation matters in general in that zone. When his service with the ambulance unit is completed he will devote his time to a series of articles for THE AUTOMOBILE, covering this field of the work. His work as ambulance driver takes him well to the front, in fact, he is operating most of the time in advance of the Italian artillery. His work is removing the wounded from the front to depots 10 to 20 miles to the rear according to the nature of wounds.

In this work he has an excellent opportunity of observing the mechanical defects and shortcomings shown by the different makes of vehicles in actual service. The vehicles employed include American, French, Italian, English and German. It is questionable if at any other point in the European war zone motor vehicles are receiving more severe service. On the Italian-Austrian front there is a combination of mountains, bad roads and extremes of climate which severely tax all motor equipment.

No European war correspondent has had a better opportunity of first-hand study of motor apparatus in the war zone than W. F. Bradley. Besides being a correspondent of the first rank he is an engineer of standing and is familiar with European practice in automobile and motor truck construction. He is acquainted personally with 75 per cent of the European engineers, has visited each year for several years the majority of the French, Italian and English factories, and has driven over the greater part of these countries. There is no one in the technical line better qualified to report the status of various automobiles and trucks in war service than he. During the past year he has been in the ambulance and other services on the Flanders front and has been over all of the fighting zone in France. His articles covering the Italian front should begin during the months of February or March.

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Colonial Motors Making Deliveries

DETROIT, MICH., Oct. 31.—The Colonial Motors Co. is now making deliveries of

motors at a rate of 5000 a year and expects within the coming year to produce from 12,000 to 15,000. The company which was organized Sept. 1 with a capitalization of $200,000 of which $50,000 is in preferred stock and $150,000 is common stock, is now producing its motors in a four-story building of 50,000 sq. ft.

C. S. Briggs, president, was president and general manger of the Krit Motor Car Co. in 1909, and the manager of the Brush Runabout Co. in 1910. E. D. Moessner, treasurer, was formerly the treasurer of the Brush Runabout Co. and the Briscoe Mfg. Co. until he resigned in 1911 to join Mr. Briggs when he formed the Briggs-Detroiter Co.

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Texas Co. Reduces Price 1 Cent

NEW YORK CITY, Oct. 29—The Texas Co. has reduced the price of kerosene 1 cent a gallon in Texas. It has cut the price of gasoline 1 cent and kerosene 1 cent a gallon in New Mexico.

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Gasoline 1 Cent Lower in Denver

DENVER, COL., Oct. 28—Another 1-cent drop in the price of gasoline has occurred, bringing the price to 21 cents at all the filling stations and many garages. Some garages charge a few cents more, on the ground that they handle gasoline mainly as an accommodation and cannot afford to bother with such a small volume of business for the 2-cent margin of profit maintained by the regular filling stations. The wholesale price to the filling stations and garages is 19 cents, while the price direct to consumer from the oil company's tank wagons in 25-gal. lots or more is 20 cents.

This is the fifth reduction of 1 cent within the last 3 months, following a long period when the retail price stood at 25 cents. The other changes took place on Aug. 14, Sept. 8 and Sept. 26.

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Harroun Motors Begins Building

DETROIT, MICH., Oct. 27—The Harroun Motors Corp. has broken ground for its first building at Wayne County. The structure will be 550 by 75 ft., two stories high and will have a wing of saw-tooth construction 140 by 600 ft. and one-story high. Both buildings will be built of brick and steel.

The Harroun corporation, according to officials of the company, have already signed applications for more than 50,000 cars from dealers throughout the United States. In addition more than $1,000,000 worth of cars have been contracted for for export.

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Plank Shaft Co. to Enlarge

GRAND RAPIDS, MICH., Oct. 25—The Plank Flexible Shaft Machine Co., this city, is considering plans of reorganization with a capital of $200,000 for the manufacture of a new flexible shaft for automobile work.

S. A. E. Day Success Assured

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516 Tickets Sold for Frolic Performance and 294 for Annual Dinner

NEW YORK CITY, Nov. 1—It is now assured that Thursday, Jan. 11, which is S. A. E. Day of New York show week, will be a success, not only from a business and professional standpoint, but also from the social side. To date 516 tickets have been sold for the special performance of the Ziegfeld Frolic for that evening, or two-thirds of the entire seating capacity of the theater. The annual dinner to be held in the grand ballroom of the Hotel Biltmore promises to outdo any similar occasion in the history of the society, 294 tickets having been sold up to the present. Last year no campaign for disposing of the tickets to the dinner was undertaken until 6 weeks before the event occurred, so this year it looks as though the grand ballroom will be filled to capacity.

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Metropolitan S. A. E. Meets Nov. 16

NEW YORK CITY, Oct. 28—The Metropolitan Section of the Society of Automobile Engineers will hold a meeting Nov. 16 at 8 p. m. at the Automobile Club of America. "Some Present and Future Scientific Problems of the Automobile" will be the subject of C. F. Kettering's address. Mr. Kettering is vice-president and general manager of the Dayton Engineering Laboratories Co., Dayton, Ohio.

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Truck Converter Contract in Dispute

CHICAGO, ILL., Nov. 1—Whether a binding contract has been negotiated between the Smith Form-A-Truck Co. of this city and the Redden Motor Truck Co., of New York, with regard to a truck converter patent issued to Albert E. Cook and controlled by the Redden company, is a matter in dispute to-day and one which apparently the courts will have to settle. Some weeks ago the Redden Motor Truck Co. announced that it had a signed contract with the Smith Form-A-Truck Co., whereby the latter concern signed to recognize the validity of the Cook patent and to pay royalties, the contract giving the Smith Form-A-Truck Co. the right to manufacture under the Cook patent.

This contract matter is now in dispute, the Smith Form-A-Truck Co. contending that the so-called contract is not in reality a contract, but only a memorandum which was signed by E. I. Rosenfeld, vice-president and treasurer of the Smith Form-A-Truck Co. The Smith company repudiates this alleged contract and has filed suit against Albert E. Cook and Chas. W. Hills, attorney for Cook and Redden, to restrain the latter from representing that they have a valid contract with the Smith Form-A-Truck Co. in which the Smith organization agrees to pay royalties. The suit entered by Smith also asks that the defendants be restrained from intimidating dealers and agents of the Smith company.

The Redden Motor Truck Co. claims that the so-called agreement or memorandum is a binding contract and that Mr. Rosenfeld declared himself authorized by the board of directors of his company to conclude such agreement.

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Watson Heads Pennsylvania S. A. E.

PHILADELPHIA, PA., Oct. 27—John W. Watson, president of the American Bronze Co., Berwyn, Pa., was elected chairman of the Pennsylvania section of the Society of Automobile Engineers at its annual meeting held here last night. A. K. Brumbaugh, assistant engineer, Autocar Co., Ardmore, Pa., was elected secretary and T. Y. Olsen, vice-president the Tinius-Olsen Testing Machine Co., Philadelphia, treasurer.

Herbert Chase, chief engineer of the Automobile Club of America, read a paper on the Otto versus the constant pressure cycle, supplementing his paper on the same subject presented before the Summer meeting of the society.

The next meeting of the section will be held Nov. 23, when John Younger, chief engineer, motor truck department Pierce-Arrow Motor Car Co., Buffalo, N. Y., will present a paper on brakes.

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Detroit Motor Lock Co. Formed

DETROIT, MICH., Oct. 30—The Detroit Motor Lock Co. has been incorporated with a capitalization of $30,000 to manufacture and license others to manufacture, automobile parts. C. R. Kerns, G. M. Conner and R. W. Muir are among the incorporators.

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Webster, Gramm Truck Man Dies

DETROIT, MICH., Oct. 27—J. K. Webster, formerly secretary and treasurer of the Gramm Motor Truck Co., who was forced to retire from the company because of ill health died here today.

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Silver to Give Up Peerless

NEW YORK CITY, Nov. 1—The Peerless business in this city will be handled after Jan. 1 by a factory branch. C. T. Silver, who has had the agency since Jan. 1, 1914, is relinquishing it to concentrate on the Chalmers and Dort lines, which he recently took over. The Peerless branch will be in the former Paige location at Broadway and West Sixty-third Street and will handle both wholesale and retail.

A. A. A. Disqualifies Two Makers

Grant and Lozier Come in for Disqualification—New Rules for 1917

NEW YORK CITY, Oct. 31—At to-day's meeting of the contest board of the American Automobile Assn. two automobile manufacturers were disqualified and fined for not advertising in accordance with A. A. A. rules as governing performances of cars in contests. The Grant Motor Car Co., Findlay, Ohio, was disqualified for 1 year, beginning Oct. 1, 1916, for advertising in connection with the performance of its car at the recent Pike's Peak Hillclimb. In addition to disqualification for 1 year a fine of $500 was imposed. The disqualification prevents it from competing in sanctioned events during the period stated. The Hal Motor Car Co., Cleveland, Ohio, was given the same punishment for advertising in connection with the hillclimb recently held at Giant's Despair, Wilkes-Barre. Other cases of advertising not being in accordance with results of contests are being investigated by the contest board, and decisions are expected at the next meeting of the board.

The Kalamazoo Motor Speedway, Kalamazoo, Mich., was permanently disqualified due to checks covering cash prizes, etc., going to protest. This is the speedway where the fatal accident happened at its 100-mile race on Aug. 27, in which three men were killed and eleven cars wrecked. The disqualification applies to the officers of the association.

To Revise Rules

The question of revising speedway rules for the coming year was taken up. Several changes were made in the rules, all for the betterment of racing. The suggestion that more cars, namely, forty, be permitted to start on a 2-mile speedway was overruled, and the number of starters in any race will remain as it was this year. The objection to more starters was largely due to the difficulty of scoring greater numbers.

The position of assistant starter was eliminated. A new position known as Clerk of Course was created. The clerk of course will have complete supervision of the track during the race, as well as immediately previous thereto.

The use of judges in connection with races has been discontinued largely because there have not been specific duties for them and too frequently they have gotten on the track and increased the congestion there.

The question of qualifying trials for speedway races has not been satisfactory this year. Speedways have charged admission to spectators for qualifying trials and frequently spectators have spent nearly an entire afternoon without getting any show for their money. This has been due to few cars presenting themselves for qualification. To avoid this speedways will be requested to have only one day for qualifying trials at which admission can be charged.

Cars will continue to start in races in order of their qualifying speeds. The cars that qualify will only be given one chance, providing they meet the qualifying speed for the race. Should they not show qualifying speed they will be given two additional trials. Cars qualifying after the official date set for trials lose their starting positions which the regular qualifications would have entitled them to.

The board practically accepted many of the recommendations which had been discussed at a recent meeting of the speedway managements, drivers, and the contest board. These included the following:

A—For 1917 no speedway championship events will be for distances less than 100 miles.

B—The minimum purse for championship events will be at the rate of $100 per mile.

C—No sanctions will be issued for Sunday races of any character.

D—In case a race is prematurely terminated due to accident the disposition of prize money rests with the contest board and the referee.

E—All prize money in excess of $5,000 must be in office of contest board not later than 10 days before scheduled date of race. It must be deposited as a certified check or satisfactory bond. Prizes of $5,000 or less must be deposited in cash or certified check with contest board representative not later than 10 days before scheduled date of contest.

F—No driver shall work on his car between the hours of 8 p. m. and 6 a. m. the night previous to a speedway race.

G—Drivers and cars will be assigned 1917 registration numbers according to championship standing in 1916. The car will carry its same racing number throughout the season.

H—Pit supplies must be on the speedway grounds not later than 5 hr. before scheduled start of the race and in the pits not later than 3 hr. before the start.

I—Speedways will pay the contest board $10 for each car which qualifies and starts in a championship event. The fund so obtained will be added to the championship award fund.

J—The 1917 championship award fund will be divided into five parts. First five drivers must appear at all championship events, unless excused by chairman of contest board, on certificate from technical representative of board, or from physician.

Numerous other minor changes were made in connection with the rules. One was to the effect that all timing and scoring records of any race must immediately after the completion of the race be turned over to the representative of the contest board or the referee.

Chairman Richard Kennerdell of the contest board has decided to visit California for the Vanderbilt and Grand Prize races.

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Estep Goes to Salonica

NEW YORK CITY, Oct. 26—E. R. Estep, formerly in charge of the Packard advertising, sailed last month for Salonica to furnish war news to a syndicate of daily papers. Mr. Estep has been much interested in the war and last autumn visited Verdun and other points on the western front.

Chevrolet's Great Development

New Departments, Increased Floorspace, Additional Machinery and Buildings

FLINT, MICH., Oct. 30—Two large buildings completed, two more in process of construction, several new departments, installation of hundreds of lathes, presses and milling machines, and double the number of workmen are some of the recent developments at the factory of the Chevrolet Motor Co.

One new building 150 by 1000 ft. has just been completed and is now used for an axle plant, engine works, transmission assembly and heat treating plant on the lower floor and as a tool room on the second floor. Next to it and of the same dimensions, is another structure recently finished which serves as an engine works and stockroom. The machinery is erected in the center of the floor, the stockrooms running along one wall with numerous doors from which the tubing, raw castings and other material can be fed directly to the workmen. Both plants are built entirely of steel, brick and glass and embody a novel and valuable lighting and ventilating system. The two walls in each structure, 1000 ft. long, are constructed of glass supported by steel and the thousands of windows are arranged on shifting mechanisms allowing them to be opened at will and throwing a powerful light into every corner of the interior, besides providing excellent ventilation. This system is supplemented by additional glass built in V shape on the roof which also has the sliding shaft allowing each window to be opened. Both structures are equipped with hundreds of new lathes, presses, milling machines and ovens.

A large building constructed in U shape with two sections each 80 by 1000 ft. and three stories high with a court 50 ft. wide in between, is in process of erection and will be used for the assembly of the "four ninety" model when completed. It is built of brick, glass and steel and will probably be ready for occupancy Dec. 1. Directly behind it the company is building a four-story structure which will serve as a power house and heating plant thus giving all necessary power from within the institution.

466,000 Sq. Ft. Added

The new buildings give the company 466,000 sq. ft. of floorspace in addition to their present equipment. There are now double the number of workmen employed 1 year ago and the completion of all buildings in process of construction will witness the addition of 1000 more men.

Many other interesting and important

features have been introduced. There is a large top department where the company paints and attaches Winter tops for the "four ninety" model when so ordered. Many new ovens have recently been purchased and installed for the paint department which have been found to greatly facilitate that work. The frames with the engines and gasoline tanks attached are placed upon trolley conveyors and sent through the first ovens following a coat of paint put on by the flow system. They emerge and pass a short distance, by which time they dry and are ready for varnishing and the second series of ovens. The varnishing is done by spraying machines. All painting is accomplished by the flow method. In the body room one may see a number of bodies arranged upon roller wheeled trucks and standing directly under a long heavy pipe filled with paint. Numerous short thin pipes feed from the main line and each is attached to rubber tubing which ends in a nozzle from which the paint flows by gravity force. Each nozzle is directed by a workman so that the paint reaches all parts of the body flowing from the upper edges to every section below.

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Stutz Wins Tucson Race

TUCSON, ARIZ., Oct. 30—R. H. Delno of Tucson, driving a Stutz, won the 50-mile free-for-all race at the Southern Arizona Fair on Oct. 27 in 51:28. Charles Miller, in a Fiat, took second place. The race was marred by a series of accidents in which three cars were wrecked and four men were injured. There were only five cars entered in the race.

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Hupp United America Car in California

DETROIT, MICH., Oct. 28—The Hupmobile United America car left Salinas, Cal., yesterday bound for Santa Barbara. The party reached Salinas, en route for Universal City on Oct. 26, coming directly by way of San José and San Francisco.

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Baldwin Is Saxon Service Manager

DETROIT, MICH., Oct. 28—G. O. Baldwin has been appointed service manager of the Saxon Motor Car Corp. Mr. Baldwin was formerly connected with the service department of the Studebaker Corp.

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Tractor Demonstration by Bullock Co.

DETROIT, MICH., Oct. 30—The Bullock Tractor Co. has secured 2000 acres of land in Schoolcraft County, Mich., and will demonstrate tractors in farming operations. Practically all of the work on the farm, of every character, will be done by motor power.

Maxwell Issues Open Challenge

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All Cars at $1,000 or Less Eligible for Speed and Economy Tests

DETROIT, MICH., Oct. 28—The Maxwell Motor Co. has issued an open challenge to all companies making automobiles to sell for $1,000 or less to compete in speed or economy contest.

The challenge states that the tests are to be conducted by newspaper men or other disinterested parties, and that the tests for speed and economy are to be held between Detroit and any other cities in Michigan. Results of the contests are to be made public through the newspapers. The only provisions specified are that the car must be a stock machine selling for $1,000 or less and that the maker or his authorized agent stands sponsor for the car.

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Accepts Maxwell Defi

G. H. Maines, Flint, Mich., has notified the Cunningham Auto Sales Co., this city, that he accepts its challenge to pit a Maxwell stock car against any other car selling for $1,000 or less, in a speed and economy race in Michigan. Mr. Maines accepts in behalf of the Chevrolet four-ninety, and suggests a race from Detroit to Pontiac, Flint, Lansing and return to Detroit by way of Jackson.

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September Exports Lower

(*Continued from page* 729)

9 months of this year they were 47,246 cars, valued at $32,291,633. There was also a big gain in the exports of parts, not including engines and tires, which showed a gain in value from $10,994,859, in 1915, to $17,322,349, in 1916.

In point of value among the purchasers of American-built cars among the warring nations of Europe during September last Russia held first place, that country's imports of American cars amounting to 670 cars, valued at $1,957,287, while the United Kingdom was second with purchases amounting to 700 cars, valued at $1,684,579. Russia did not figure in the export returns in September a year ago, but the United Kingdom was there to the extent of 2650 cars, valued at $3,119,806, while during the 9 months of last year the latter imported from this country 19,434 cars, valued at $28,648,749. Russia does not figure in the 9 months 8 returns of this year.

653 for France

France imported 653 cars, valued at $1,523,761, from this country in September last, as against 421 cars, valued at $916,830, in September a year ago. That country's purchases during the 9 months' period showed a gain from 4885 cars, valued at $12,126,628, in 1915, to 6497 cars, valued at $16,529,055, in 1916.

Little Denmark figured to the extent of 177 cars, valued at $139,301, in September, last, and 936 cars, valued at $714,412, during the 9 months of this year, Denmark not being included separately in last year's returns. There were 1144 cars, valued at $3,341,676, exported to "other Europe" in September a year ago, as against 248 cars, valued at $232,579, shipped there in September last. For the 9 months' period these shipments decreased from 6688 cars, valued at $18,082,964, in 1915, to 3102 cars, valued at $3,867,419, in 1916. Of course it is to be understood that some of the exports to "other Europe" are included in the figures given elsewhere.

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Black and White Taxicabs in New York

NEW YORK CITY, Nov. 1—The Black & White Cab Co. is now running its full force of taxicabs on the local streets. At the present time there are about 200 of these in service. This company is featuring its service with much lower rates, regardless of number of passengers up to five, which are 20 cents for the first one-third mile and 10 cents for each additional one-third mile. Thus the first mile will cost 40 cents, and all miles thereafter will be 30 cents. These new taxis have electric lighting and an electric device on the outside of the car which illuminates the numbers on the houses and assists the driver in readily finding places. The car presents the appearance of a private limousine. In the Winter it will be equipped with heating apparatus and rugs.

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24-Hr. Endurance Run in New Jersey

NEWARK, N. J., Oct. 30—A 24-hr. endurance run will be held by the New Jersey Automobile and Motor Club, this city, on Nov. 24 and 25. The run will start and end in this city, and the course will be through North Jersey, covering 250 miles. The competing cars will be divided into two classes. One class will be composed of touring cars and the other of runabouts.

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94 Car Exhibitors at Los Angeles

LOS ANGELES, CAL., Oct. 28—The second annual show of the Los Angeles Motor Car Dealers' Assn. opened this afternoon with ninety-four exhibitors, displaying 226 cars. There are twenty-one accessory exhibits. Fifty makes of gas cars, twenty-two trucks and two electrics are shown. A three-story building and two tents provide more than 55,000 ft. of floor and 6000 visitors were admitted this afternoon.

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Truck Progress

THE outstanding feature of 1916 from the viewpoint of the truck industry is the immense increase in production. The truck bearing the 1917 stamp is, on the average, a better truck than its immediate prodecessor; there have been many engineering developments of a character which show that the truck is settling down into a condition of engineering stability far greater than has ever been the case before. But these lesser things sink into insignificance beside the production figures and the record of factory expansion.

The truck business has been coming for years and it has hardly yet "arrived" in a final sense. The truck industry, as distinct from the passenger automobile business, is not yet beginning to stir the imagination of the financiers, and perhaps this is just as well. The automobile industry had to go through some hard times before it became a staple industry; its finance has often been none too sound in character, in fact it will be some years yet before it is on a really permanent basis. If the truck industry as a separate thing can be allowed to grow more slowly and consolidate itself as it goes, it will be so much the better for it in the end.

The truck industry is a part of the automobile industry in one way, but it is a separate thing in many others; so separate that men experienced in passenger car work, either engineering, sales or in some other capacity, may actually be less fitted for similar positions in a truck firm than outsiders who have no passenger car experience behind them. One might almost liken the two to the army and the navy, sister services, but with totally different duties and procedures. For this reason the financial handling of truck businesses ought usually to be distinct, and the present indications are that this will be so.

Power Braking

WHETHER the device described elsewhere in this issue of THE AUTOMOBILE provides an ideal method of using the engine power to apply the brakes of a car, or whether it has some drawback yet to be discovered, it marks a step in the right direction. That the power of the driver's leg should be utilized to apply the whole retarding force to an automobile is just as absurd as to require hand starting for an engine already provided with an electric generator.

We have eliminated hand cranking, we have electric transmissions and electric gearshifts, we have reduced the pedal pressure necessary for the clutch manipulation, but brakes have not been made any easier to apply. Thus a power brake is a logical step, as logical for an automobile as for a street car. The electrically applied brake has been with us for some time, and it is a remarkable thing that it has not been appreciated. Perhaps it will be now that we have this new vacuum brake which unquestionably will be tried out on a large scale. Directly any number of manufacturers begin to experiment with these devices we shall see the engineering brains of the profession turned to the consideration of brakes in general and the result cannot be otherwise than to cause a great improvement to take place.

Credit Where Due

AFTER the Astor Cup race at Sheepshead Bay THE AUTOMOBILE criticised the management of the track somewhat severely, particularly with respect to allowing the crowd to get on the speedway itself. Last Saturday the Harkness Trophy race was handled much better, the worst feature being the tardiness in the announcement of times and speeds, though this was better than on the last occasion. Better facilities must be used to quickly advise the grandstand of times, incidents, etc. The track guards were as efficient as could be desired.

The pitiable thing was the meager sprinkling of people. It was a great day and there was great racing, yet to look at the stand there might have been a cutting northeaster blowing and only a half-dozen second rate cars on the track. New York has not yet been awakened to the existence of the speedway. It is not apathy on the part of the public, but lack of sufficient means to let that public know when races will take place and what sort of races they will be. The New York public has a thousand attractions thrust before it every day and the speedway needs a few good thrusters to help draw in the crowds that would come if they thought of it.

The Truck's Emancipation

Truck Engineering Now Separated from Passenger Car Design—Many Factors Have Contributed to Evolution — Early Originality Choked by Passenger Car Influence Now Reasserting Itself

By A. Ludlow Clayden

THE design of commercial chassis is not yet as far advanced as that of passenger cars. The motor truck is not yet quite so good for its specific purpose as is the passenger car for its particular class of service. The reason is that the requirements of a motor truck are so much more difficult to meet; the task of the truck engineer is harder than that of his passenger car brother.

The history of the truck has been very interesting. It was the earliest ideal and, if we eliminate the very first years of all, it is safe to say that the success of the railroad in cheapening and expediting the transport of goods inspired a great number of men with the idea that mechanical power ought to be used similarly upon the roads. It is an undoubted fact that the engineering profession generally looked upon the development of the motor truck as quite reasonable at a time when it was ridiculing the passenger car movement.

Practical Trucks Fairly Recent Product

However, despite the greater age of the motor truck idea, it is only within the last few years that we have had really practical machines, and the advance since about 1908 has been greater than in the whole of the previous century. There have been several stages in the modern development of the truck. Sixteen years ago Europe had a number of quite good steam vehicles, and there was some tendency in America to follow the foreign lead. How strong this movement was in England particularly, can be seen by the fact that the heavy vehicle section of the London show in 1904 contained but three gasoline machines, while there were ten exhibits of steam lorries, and of the three one was a very light van.

At the same period in America there was no marked tendency in truck engineering, unless it was toward the electric. Neither for commerce nor for pleasure has the electric ever been more than a curiosity in Europe, but America, thanks to her magnificent electric power stations, was able to build quite good battery cars of all sizes at an early date. There was little or no trouble even in 1900 in making a chassis that would stand up, nor in designing satisfactory electric motors; the battery was the weak spot. Still in the early days of this century electric vehicles were operating with reasonable economy, and the struggle to produce steam or gasoline machines was stimulated as much by a desire to increase the speed and possible operating radius as to overcome any lack of reliability in the electric. It is not easy to draw an exact parallel, but it is not far from the truth to say that in 1905 the steam lorry in Europe and the electric truck in America occupied about the same position in usefulness and public estimation.

Both in Europe and in America, but more especially in the latter country, a very curious situation was to be observed in the years between 1900 and 1907. The manufacturers of passenger cars were provided with two pioneer examples or models, these being the Daimler as originally produced in Stuttgart and the Panhard in Paris. Almost every European manufacturer copied one or other of these two and the majority copied both. In America there was greater originality, but the passenger car men soon turned to copying Europe, except for a small minority of whom Charles E. Duryea was probably the leader. On the whole, however, the passenger car manufacturer has never changed his engineering in such a way that it cannot be traced back to Panhard or to Daimler.

Not so with the truck industry. There seems to have been a fixed impression up to about 1903 in Europe and till a much later date in America that the truck had essentially to be something quite different from the passenger car. The Panhard sliding gear transmission, for example, while admitted for a passenger car was regarded as quite unsuitable for heavy work, and the quickly attained agreement that four cylinders was the minimum for pleasure cars had little effect upon truck engine design. As late as 1906 the typical American gasoline truck, if there was such a thing, had a two-cylinder engine, under the body frequently in conjunction with a planetary transmission and often a single chain drive to a live rear axle. This was partly owing to a strong idea that the ideal truck had the maximum of body space with the minimum of overall dimensions, and accessibility of engine and running gear was sacrified in order to get short wheelbase. Of course the makers of gasoline vehicles had the electric as an example in this respect which may be another reason why so few firms in 1906 or so were developing the type of truck almost universal to-day which had the general layout of the passenger car chassis despite great differences in detail.

Worm Drive at First Truck Show

At the first commercial vehicle show held in America at Chicago in December, 1907, an analysis of the twenty exhibits shows that nine firms were using sliding gear transmission, three planetary gearing and three friction drive: four were electrics and one a gas-electric car. It is also worthy of note that a "startling novelty" was the Mitchell truck with worm drive. Only one of the trucks exhibited had the engine under a bonnet. This show took place at the end of 1907, so to jump to the New York exhibition of January, 1912, is to leap a period of 4 years. Between the machines here shown and those at the 1907 exhibition there is surprisingly little difference, judging by exterior views. *The Commercial Vehicle* published specification tables for the 1912 show, similar to those appearing in this issue of THE AUTOMOBILE, and in them is seen that the majority of light trucks had one, two or even *three*-cylinder engines, at a time when the passenger car was not much different from what it is to-day. Certainly the larger trucks had four-cylinder engines, but friction gearing and planetary gears

were still popular in all sizes and very common for the lighter vehicles. The beginning of the engine under bonnet era is quite noticeable in the machines of this date. The previous year, 1911, is also noteworthy in truck history, because it was in the summer of that year that the Pierce-Arrow worm-drive truck came upon the market, this being a European design so far as layout went and American in all matters of strength. This Pierce-Arrow vehicle certainly marked a definite point in American truck engineering, because it was the pioneer of a type that is in wide employment to-day.

The influence of the manufacturers of passenger cars upon truck engineering has been very considerable. Some of the leading passenger car makers made a success immediately upon entering the truck field, others did not do so, but in the first category must be mentioned Pierce, who had a complete new design in 1911 and White, Peerless and Packard who adopted a more usual method and an easier one, of getting into the second branch of the automobile industry. Knox also should be mentioned as an example of a concern which gradually dropped passenger cars altogether and became truck makers only.

By 1910 or thereabouts most of the leading passenger car builders had developed engines of a very rugged character which were quite reliable and fit for somewhat heavier duty than they normally received. A good number had transmissions arranged amidships which were stout enough to withstand constant gearshifting and possessed a high degree of reliability.

Converted Passenger Cars

The makers of such cars argued with themselves that the essential difference between a passenger car and a truck laid in the strength of the frame and axles, it being essential that these should be able to support a greater load and be able to withstand more severe road shocks. It was therefore a very natural and a very easy development to take the existing transmissions and engines and mount them on a channel steel frame and to provide the transmission with a jackshaft, propelling the rear wheels by means of a pair of chains. Subsequent development has shown that the passenger car engines and transmissions of about this date were really too massive and for this reason they were well able to stand up under the severer conditions of commercial service. To make forged axles of sufficient strength and to build a frame which would not bend were neither of them difficult achievements, so that the established passenger car maker using his already well-tried powerplant and having only frames and axles as new parts was in a somewhat better position than a specialist on truck manufacture who had to develop engines, transmissions and everything simultaneously.

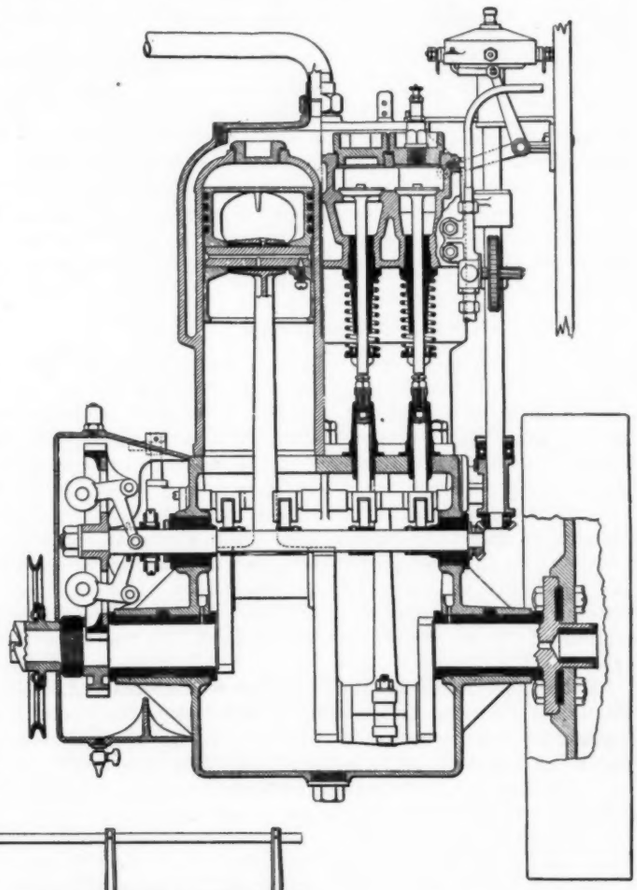
Packard was one of the earliest of manufacturers to add a truck to an existing passenger car line, bringing out a two cylinder vehicle in 1904. This had an engine which was practically half the four-cylinder touring car motor, which was then new, and the transmission was identical with the passenger machine. The illustrations of this car taken from *Motor Age* of 1904 show that the truck of 12 years ago had some points of resemblance to that of to-day.

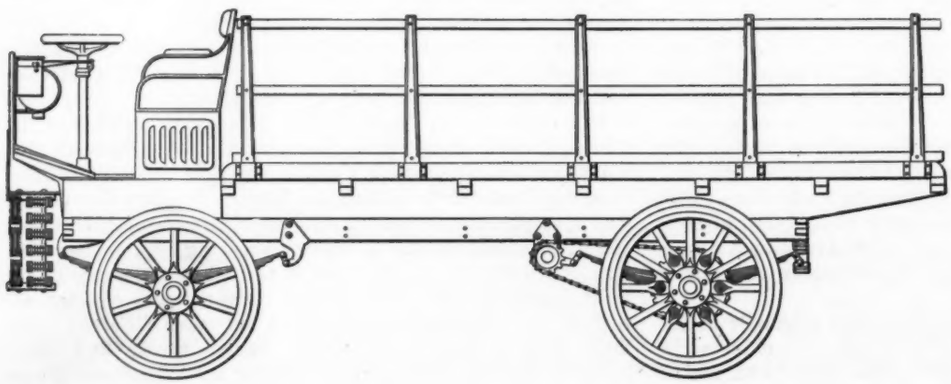
Stock Parts Makers Enter Field

Some of the machines originally created by this method are still being made in practically the same form in which they were originated. Others have but lately been changed by a complete redesign and, meanwhile, the makers of stock engines and other stock parts have entered the commercial vehicle field making large use of their passenger car experience while so doing.

The action of the first passenger car makers breaking into the new field coupled with the development of the stock part manufacturers has completely altered the general makeup of the truck. It was said at the beginning of this article that the majority of passenger cars could always be traced back to Daimler or Panhard and this has now come to be true in the majority of trucks.

Analyzing the development of the truck in this way one is faced with a problem impossible of solution, and this is





Drawings of the first Packard truck with two-cylinder engine and the same transmission as was used at the time for the Packard touring car. Packard used touring car parts in trucks for many years quite successfully

whether the average truck has a four-cylinder vertical engine under a bonnet and sliding gear transmission and some kind of live rear axle, due to the fact that these details comprise the best machine, or whether it is due to the fact that the entrance of passenger car makers into the truck field exercised an overpowering influence on truck design.

For example, the reliability of the present-day truck is extremely good. It is so good that the necessity for placing the engine under a bonnet and so wasting 2 or 3 ft. of frame is still debatable. The passenger car makers used a bonnet because it was their practice, thus following in the footsteps of their European predecessors. We do not know for certain whether it might still be worth while to seat the driver on top of his engine.

Original Design Still Existing

It is unfortunate that so many of the very early truck makers went out of business, for had they continued to exist we should have been better able to judge the real virtues of different types of design. Just to mention one outstanding example the case of the Autocar company may be taken. This concern produced its first truck with a horizontal engine, not under bonnet, in 1908 and it is still making a machine which follows the same general lines. The Autocar truck has a high reputation and the fact that the company has not abandoned their type of power plant is not due to conservatism, since they did experiment with the vertical four but returned to the original construction as preferable.

Again, with respect to transmissions, the planetary types which were abandoned one by one in favor of sliding gear transmissions had not had a tenth of the experience and knowledge put into them which has been given the sliding gear. The planetary transmission, all other things being equal, ought to be more durable than the sliding gearset. The sliding gear is easier to make right. Is it not probable that this is why it is the commonest type to-day? At the present moment the speed change mechanism is regarded as the weakest point in the passenger car. For really efficient operation it calls for considerable skill on the part of the driver. It is noisy, the gears require occasional replacement and there is a quite perceptible drop in efficiency when the indirect ratios are in use. These facts have led passenger car engineers to produce cars with enormously more engine power than is necessary for the work they have to do. Interest in electrical variable speed transmissions is growing very steadily, if not very rapidly, and that the passenger car industry will try out various forms of electrical transmission on a large scale is now assured. It may be next year, it may be the year following, it may not be for 4 years, but the electric transmission year is coming just as surely as the six-cylinder engine was coming in 1911.

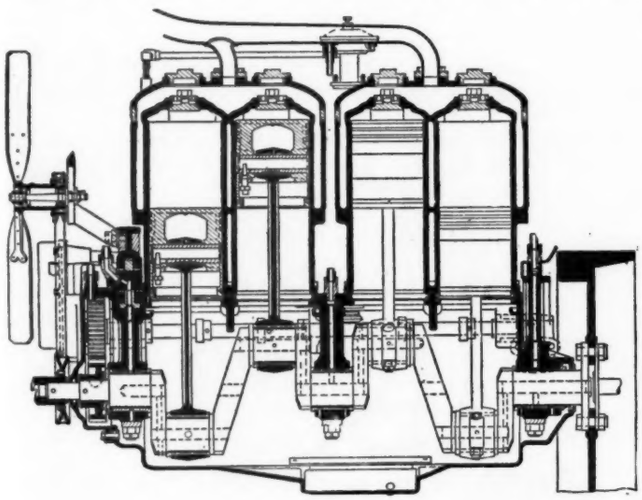
If this happens, what is going to be the reaction on the design of trucks? If the passenger car trade still largely controlled the truck industry it would be natural to assume that any really vital change in passenger car engineering would be followed by a corresponding change in truck design. But it appears now as likely that the big producers of trucks will be truck makers exclusively. It seems more likely that the successful firm making both trucks and passenger cars will split its business into two separate organizations than is it probable that more passenger car makers will enter the commercial vehicle industry. Furthermore, we are now training a large number of truck engineers and in a few years' time there will be hundreds of men who commenced their automobile career in the commercial field, who have never had any passenger car experience, and the effect of this is bound to be noticeable.

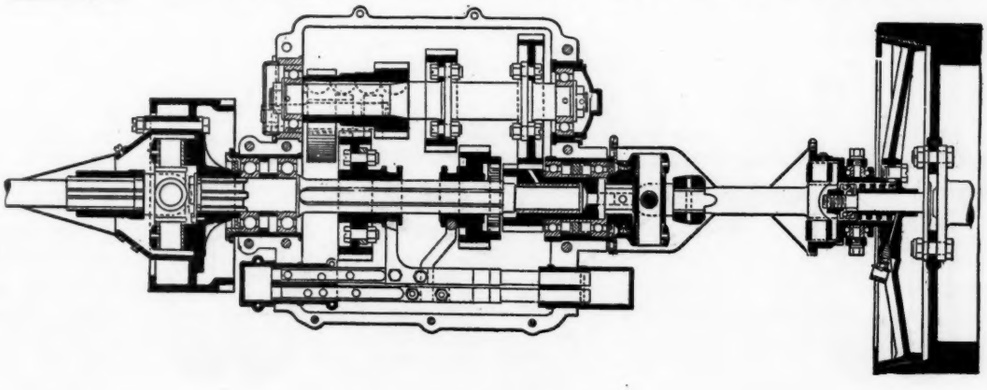
Truck and Car Essentially Different

For one thing it is already quite obvious that there are essential differences between the passenger car engine and the truck engine. They are tending at the moment to grow more different rather than more alike. The majority of truck engines to-day work at their maximum power for a large proportion of the time they are in use, whereas the passenger engine but rarely does this. Consequently, the truck engine needs larger bearings in proportion to the internal stresses at maximum horsepower, its cooling requires to be, if anything, more thorough, and all parts of the engine must be proportioned to resist shocks which need not be allowed for in designing passenger car engines. Again, fuel and oil efficiency are vital factors with a truck engine whereas they are secondary to smoothness and quietness in a passenger car power unit.

It is almost possible to sum up the situation briefly by saying that the truck industry is developing the large, highly efficient four-cylinder engine simultaneously with the abandonment of this type by the passenger car industry.

Turning to transmissions there is very little demand in the pleasure car field for anything except three-speed gearsets of comparatively cheap construction and this is because the bulk of the running is done on high gear. This is not true





The engine and transmission of the first Pierce-Arrow 5-ton truck introduced in 1910-1911. This machine was a combination of American and British practice, the engine being almost entirely American

of a truck and it is only recently that entirely satisfactory gearboxes for trucks have been purchasable as stock parts. Here again difference in ideals is apparent. In a passenger car gearset quietness is much desired. In a truck efficiency, long life and ease of gear shifting all come far ahead of quietness in the list of desired qualities. It is easy to make a good passenger car gearset because the passenger car transmission is used only occasionally. With a truck it is difficult because the transmission is in use for a large proportion of the time.

Of course, when we come to the final drive the truck has always been essentially different from a passenger vehicle. As soon as chains were abandoned on passenger cars and the bevel driven rear axle replaced then it was obvious that the truck of the future would have a different final drive. As long as we continue to use road wheels between 30 and 40 in. diameter it will be impossible to use a rear axle for heavy vehicles with a single bevel gear reduction, solely because of the available space and the great gear reduction required.

Enter the Worm

The rapid development of final drives alternative to the chain dates from the introduction of the worm drive in the Pierce-Arrow in 1911 so far as American engineering is concerned. Of course there had been plenty of rear axle constructions in use before that time, but it was the action of the Pierce company in adopting the worm which really started the great general movement away from the chain. Here again it is extremely difficult to discover the true reasons for various obvious facts. The chain drive, if laid out properly, if chains are good and particularly if the chains are inclosed, has many advantages not possessed by any other form of rear axle drive. The worm axle, the internal gear axle and the double reduction type all have special points in their favor. They are alternative methods of arriving at the same end. On the whole, it is less surprising that we should have four different forms of final drive all giving much the same result than that we should have many more than 400 different kinds of carbureter between one and another of which there is very little to choose.

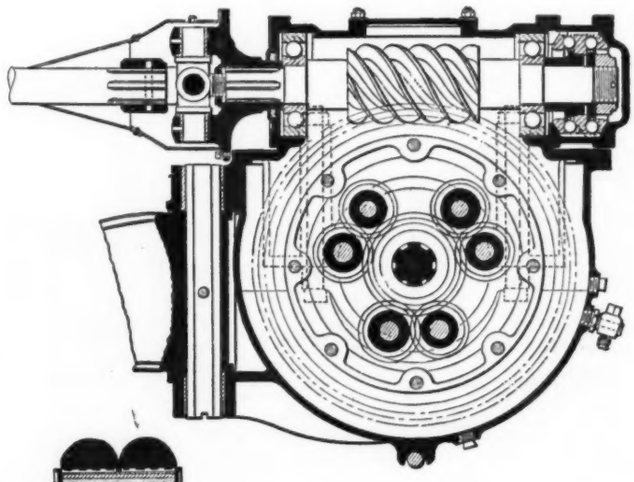
The important fact, however, which it is desired to emphasize, is that whatever the ultimate answer may be with the final drive problem it has got to be worked out by truck engineers, and the passenger car industry can give no help whatever.

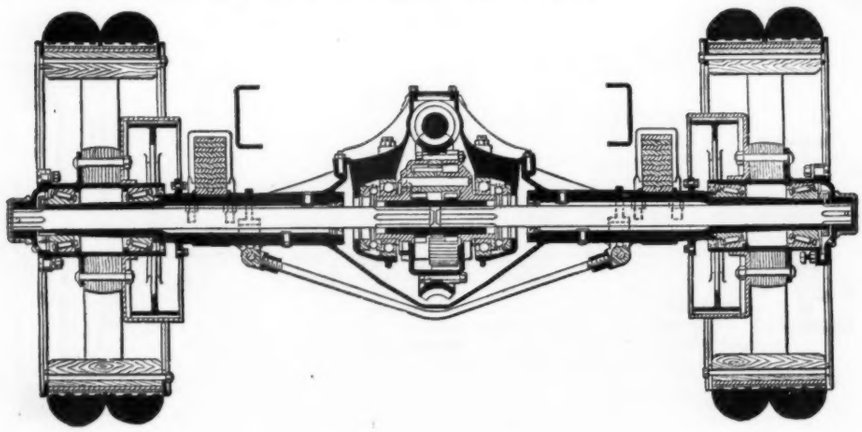
In a sense it may be said that this question of final drive is the first problem the truck industry has had to decide for itself. Previously it has always been able to look for assistance from the accumulated experience of the passenger car manufacturers. Some people occasionally voice surprise at the extraordinary vehemence of the protagonists of the various forms of final drive now being used in trucks, expressing wonder that we have not seen the same situation with regard to the position of the engine, the number of cylinders and every other point of truck construction which has been debatable in the past. The explanation most probably is that a young industry is very much like a young man and is extremely positive when it makes any assertion. The final drive is the first highly debatable subject which has arisen since the truck industry existed as a strong and healthy individual, since it was freed from the apron strings of the passenger car.

Final Drive Petty Question

Actually the question of final drive is one of the least important which the truck industry has to face. Efficient transmission between the engine and the rear axle is far more important, the economic value of trailers is perhaps more important still, while the utilization of fuels cheaper than gasoline is so much the greatest problem that all others sink into insignificance beside it.

To use the oldest metaphor, to argue about the detail design of rear axles is a magnificent instance of the tendency of men to fiddle while Rome burns. It is a fact that the electric power situation interests anticipate a greatly increased use of electric vehicles as a result of price of gasoline. It is also a fact that it is perfectly practical and possible to run engines on fuel far less refined than gasoline. Even though the price of gasoline may fall again it seems incontestable that something a little heavier must always be cheaper than gasoline itself. The automobile industry throughout the world has refused to face the problem of fuel supply right up to the present year but that it has to be faced now is at last realized and work is commenced which ought to have been begun 10 years ago. The user of a passenger car reckons his fuel bill as important, although actually it is but a small proportion of his total expenditure. To the truck user the fuel cost is *vitally* important, so important that the user will find means to employ some cheap fuel even if the manufacturer neglects to tackle the question.





The first 5-ton Pierce-Arrow truck axle with worm drive. This was a purely British design and the worms were at first imported from England but later made here

At the present time there are actually on the market, or about to come upon it, all kinds of devices for utilizing kerosene in engines designed to operate gasoline. Like most specialities of this sort put out by irresponsible people with no reputation to lose, a majority of these heavy fuel devices are of negligible value. The most extravagant claims are made for them, they will be sold in fairly large quantities and they will encourage in the truck user a belief that the successful burning of kerosene in a truck engine is impossible. Perhaps of all the special vaporizers just two or three will give good results. For the *industry* to find out which two or three deserve notice would not be difficult, would not take long, would not call for much expenditure of money. The *private user* will never find out except by happy accident. If 2 per cent of the kerosene-burning attachments advertised are really capable of doing the work claimed for them, this means that 98 per cent of private purchasers of kerosene vaporizers will be disappointed.

The industry, if it likes to take the trouble by finding out which is a good kerosene carbureter and then fitting it as stock or as alternative stock on its trucks, could go far toward reversing these percentages, changing the proportion of satisfied truck users from 2 to 98 per cent.

Another matter which is pure engineering and yet one which hardly any truck engineers having opinions on, is the question of what should determine the width of tire. There is no really good rule for determining the width as to the most economical method of tiring a truck. Some claim that very large tires will have an enormous life and therefore be the best. Others say it is better to use smaller tires and renew them frequently. This is the kind of thing which ought not to be a matter of opinion. It is simply a question of fact and to prove the case needs merely the collection of sufficient data.

Spring Suspension Faulty

Quite a different matter, which is an example of a surprising neglect of an opportunity for ingenious engineering, is to be found in the spring suspension. It is recognized that a truck is more easily damaged by being run light than run loaded. If a truck has springs which are correct for the loaded weight they are bound to be so stiff when unloaded that they become practically solid bars of steel. If we had only the two cases of full load and no load there would be reason enough for endeavor to improve upon the system of springs. But when we remember that the truck must frequently operate in a half loaded condition the importance of spring design becomes even more obvious.

For the sake of the goods which the truck is carrying, if these are of a fragile nature, and for the sake of the truck itself at all times, it is vitally important that the spring should be just right for the load whatever the load may be within the limits of no load and maximum load. Many engineers have evolved systems which will increase the stiffness of the spring automatically as the load increases but these men are usually looked upon as cranks.

Here, undoubtedly, the passenger car is exercising a vicious influence. On a passenger car a fixed spring is satisfactory, but this is no more reason why it should be satisfactory on a truck than does the suitability of beefsteak as an article of human diet prove its suitability for horse feed.

Possibly these strictures on present-day truck engineering may be thought needlessly severe. If this should be the case let it be remembered that the truck as applied to the service of industry is only just emerging from the experimental stage. It is only within the last 2 years that the public of the business world has realized the truck has come to stay. Three years ago the majority of business men in America would have bought horses and wagons with possibly just a passing thought about the truck. If the truck salesman happened to catch them just at the psychological moment the deal was sometimes engineered. To-day the situation is entirely changed, and a man who has goods to transport thinks of the motor truck first of all. We are reaching the stage where the question to be answered is more *which* motor truck than *whether* a motor truck. Before the passenger car had reached the stage of reasonable reliability and efficiency many hundreds of thousands were in the hands of private users. It was the accumulated experience of the individual owner which changed the passenger car from what it was in 1906 to what it was in 1912. It was in the trouble department of the factories that the engineers were able to discover wherein their designs were wrong.

Looking back through the years you can see some of the big things which were done in those 6 years. First, axle breakage was practically ended, spring breakage was very much reduced and last, if not least, the drawback of hand cranking was abolished. To-day we realize that to expect the owner to continually indulge in the athletic performance of cranking his engine was ridiculous, but one would have hesitated in 1906 to say that the absence of a self-starter was an absurdity.

Particular Problems of Truck Engineering

The truck industry has only just been given the opportunity of waking up to the peculiar particular problems which concern it vitally and have nothing whatever to do with the passenger car, and one of these is variable spring suspension. There is nothing so risky as prophecy, but there are just three things in truck engineering which seem bound to come:

One is the variable springing just mentioned.

Another is the use of cheap fuels.

The third is an improvement in the transmission system so that a wider range of variation is obtainable with even less skilled operators.

The four-cylinder engine does its work so well that there is little reason to anticipate any early change with regard to the power unit.

In frame design we may see still greater care, for flexibility we may see something like a three-point suspension for the body on the chassis or we may see flexible bodies which will weave with the frame.

A little detail which is coming, and not before it is needed, is a better protection for the driver. A high dashboard with a cowl excluding side doors and even windshield are things which tend to increase the comfort of the operator and therefore increase his efficiency. The cost is very small and there is no reason save custom why they should not be provided.

Of the debatable points in truck futures none stands forth more prominently than the trailer. Is it a real advantage or will it prove an economic mistake on a large scale? Manufacturers and users are divided on the question just now, but it will only take a year or two to prove the issue. Almost certainly we shall find that trailers pay under some conditions and do not do so under others. There is a chance here, though, that we shall make a discovery that may not be altogether anticipated, and this is that there is a real field in ordinary commerce for some form of road train.

The road train has hitherto usually been too complicated and too costly to permit it to be tried out on a large scale, and no small scale experiment can prove anything very much, but road trains could be built much simpler, especially gas-electric road trains. In Europe development is continuing steadily, which means that data are being collected and that we may one day wake up to find the road train a factor to be reckoned with. On the other hand it may die out in competition with the tractor and plain trailers. The thought just now is that the situation ought to be watched carefully; the truck is breaking away from the passenger car in engineering as in many other things and no man yet can tell how wide a breach the future is to show.

1916 Output 98,000 Trucks

58,000 Built in First 6 Months of Year—116,000 Predicted for 1917—Better Manufacturing Methods Overcome Increased Materials Cost and Higher Wages

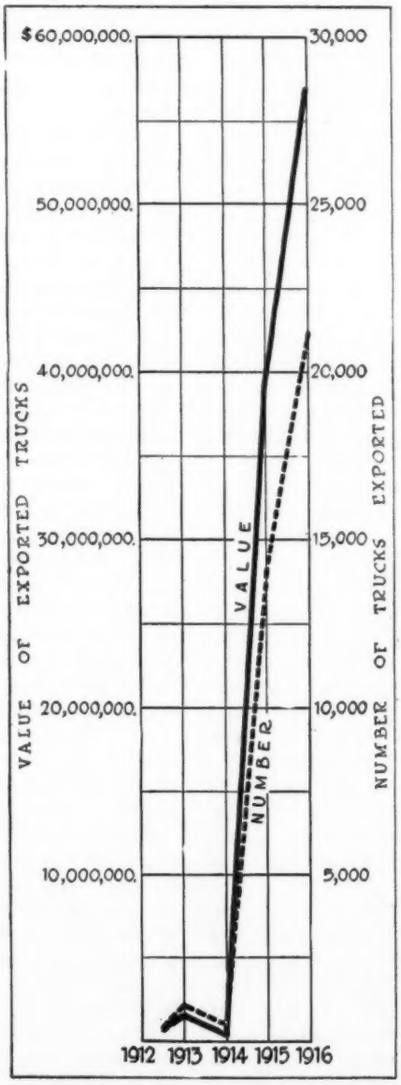
By Donald McLeod Lay

ALL production records in the history of the American motor truck industry will be shattered by the output of 1916, a total of 98,000 commercial vehicles being scheduled for the year. Of these approximately 58,000 were built during the 6 months covering the period from Jan. 1 to July 1. As compared with the number of trucks built in 1915, the current year will show an increase of 25,000, the total for the 12 months preceding Jan. 1, 1916 being 74,000 vehicles. For 1917, still greater expansion is promised, an estimate for the total output based on data furnished by the manufacturers being 116,000 machines.

In contrast with the big development of the motor truck industry in 1915, when production more than doubled over that of the previous year, jumping from 35,000 to 74,000, war business has played a decreasing part in the still greater volume of business which characterizes 1916. Although thousands of trucks are still pouring from our factories in response to orders from the belligerent governments of Europe, our manufacturers have realized that this business is at best merely temporary and are bending their efforts to widening the domestic field and building up new markets for export. And as war orders are being completed, production does not decline throughout the industry as a whole because the enlarged requirements of the business men of the United States and other countries keep the factories working at top speed. Unlike the war order business, this increased demand means permanent benefit to the manufacturers and practically all of them realize this fact. This is one reason why the estimate of motor truck production for 1917 is nearly 20,000 higher than that for the present year and it must not be forgotten that war orders are not reckoned as a factor in the business of the coming year.

From data furnished by the manufacturers approximately 50 per cent, or 49,000, of the 98,000 trucks, to be built during 1916, will be of 1500-lb. capacity or under; 25 per cent, or 24,500, will be of the 1, 1½ and 2-ton types; 20 per cent, or 19,600, will be of 3 and 3½-ton capacity; and the remaining 5 per cent, or 4900, will be vehicles of 5-ton capacity and over.

The field for the light delivery vehicle has been considerably widened this year by the introduction of numerous devices and attachments for converting Ford chassis into machines of this type. There has been a normal proportion of increase in the demand for practically all the various capacities, although the large numbers of the vehicles of medium capacity ordered for military purposes in Europe and by the United States Government for service on the Mexican border have greatly increased the production of these types. It must not be overlooked, however, that another cause for the striking acceleration in the manufacture of light delivery cars is the tremendous development of its field in the small towns and semi-rural communities where the grocers, butchers, dry goods stores, plumbers, and others have at length awakened to the possibilities of broadening their businesses by means of these machines. This year has also seen remarkable progress in the adaptation of the heavy commercial vehicles to numerous branches of industry, contractors, lumbermen, road builders and others finding these types of enormous value both as time and labor savers.



Number and value of motor trucks exported in the past 5 years

While the motor truck industry profited considerably by the European war, which not only increased the demand for commercial vehicles for war purposes but also opened new avenues of trade in the export field, the high materials prices caused by the conflict constituted the most serious hindrance to the increase of production during the year. When it is considered that malleable iron is 33 1/3 per cent higher than before the war, steel bars 40 per cent higher and alloy steel 100 per cent higher, it is no wonder that a number of our manufacturers have been obliged to increase the prices of their vehicles. Nor are the materials mentioned the only ones which are used in motor truck construction that have been increased in price due to war conditions. Among others may be mentioned cold roll steel 60 per cent higher in price than in normal times, forging billets 90 per cent, carbureters and brass work 25 per cent each and woodwork 20 per cent. Leather is much higher, aluminus more than double its previous price and many other materials which are used directly or indirectly cost the manufacturer far more than was formerly the case. In addition to the increased cost of materials the motor truck manufacturer has had to contend with labor difficulties due to demands for higher wages, shortage of skilled mechanics and factory workers

and higher costs of transportation. Improved manufacturing methods such as systematic layout of plants, progressive assembly methods, better equipment and higher general efficiency have enabled the truck builders to successfully overcome the difficulties presented by higher production expense in almost every instance and it is solely due to the development of these factors that the prices of motor trucks of all types have not been considerably advanced. Moreover it is the continued use and more advantageous adaptation of these methods which will enable the American commercial vehicle manufacturer to compete with the European product in the export field after the war is over. From the reports of the progress made during 1916 in the direction of reducing expense of manufacture another feature which promises to be of value in this connection is the policy of many companies to produce as much as possible of each vehicle in their own plants. A number of parts which were formerly purchased outside are now manufactured at much lower cost, thus doing away with not only the additional expense necessarily entailed by having them made in another plant, but also with the cost of transportation and frequently of unpacking, handling, etc.

In keeping with the more settled character of the industry, the manufacture of motor trucks is getting away from the seasonal activity which characterized its early years. Demand is of course not yet entirely coordinated with production, but it is much more uniform throughout the year than was formerly the case and indications are that a steady improvement will take place from year to year. July and August seem to be the only months when the truck factories show any tendency to slacken the pace of production and even at this time of year they are far from idle, many of them being obliged to work night and day to keep up with their orders.

Distribution of Truck Makers

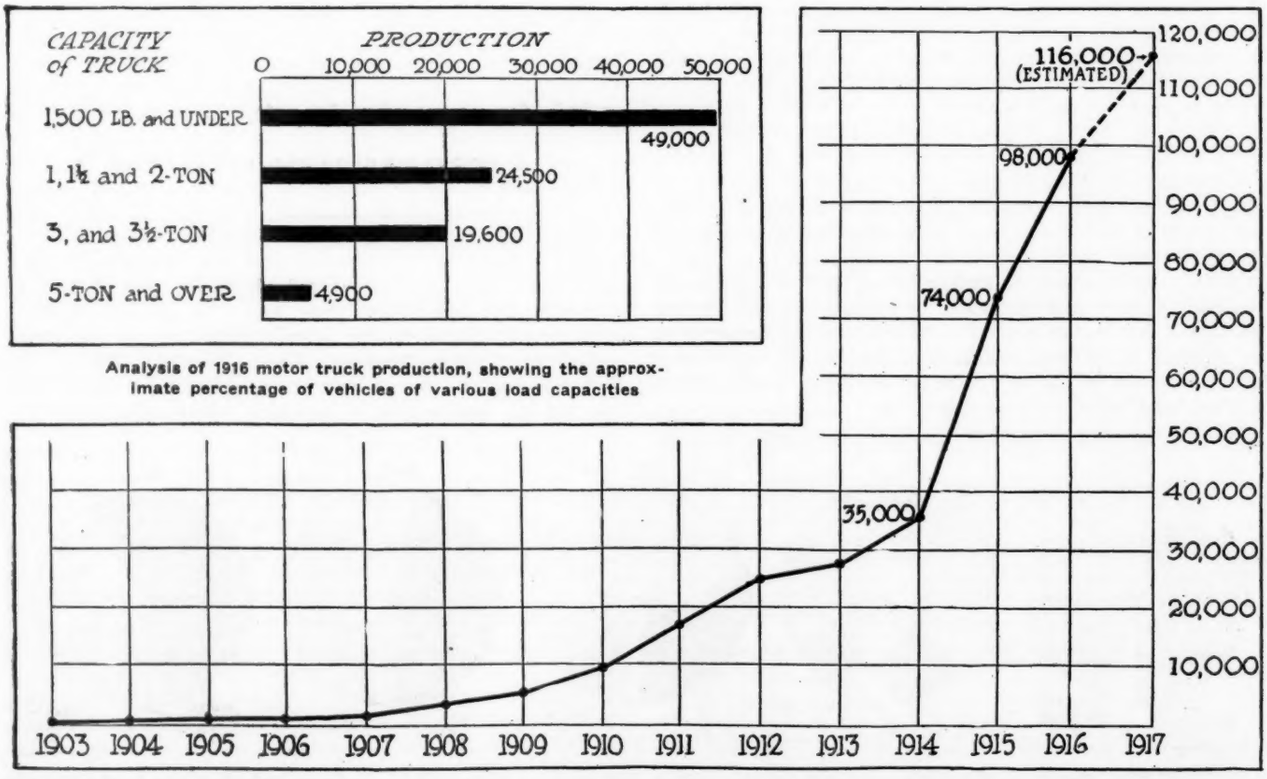
State	Truck Makers
California	17
Colorado	..
Connecticut	4
Dist. of Columbia	1
Georgia	2
Illinois	42
Indiana	13
Iowa	9
Kansas	1
Kentucky	3
Louisiana	1
Maine	1
Maryland	2
Massachusetts	13
Michigan	40
Minnesota	35
Missouri	10
Nebraska	2
New Jersey	7
New York	44
North Carolina	1
Ohio	46
Oregon	..
Pennsylvania	24
Rhode Island	1
Texas	1
Virginia	1
Washington	6
West Virginia	2
Wisconsin	13
Total	342

Refinancing to provide for factory and general business expansion has not as yet become as general in the motor truck industry as with the passenger car builders, but during 1916 several large companies have been obliged to expand their plants so rapidly and to such an extent that additional working capital was imperative. Entire new factories have been built this year and factory additions costing millions of dollars have been erected and others are still under construction, machinery and other plant equipment has been ordered in prodigious quantities and yet the working forces of the various factories have been only slightly increased, showing that better manufacturing methods and improved facilities have played an important part in this year's record. As an example of the heightened efficiency which is typical of truck factory operation, twenty-three of the leading manufacturers reported an increase in production for the year just double the increase in the number of men employed.

The increased difficulty of obtaining materials had a marked influence in holding up deliveries of trucks from the factory as well as interfering with production schedules, frequently making it impossible to run a plant on an even basis. Gearsets and shafts, alloy steels, aluminum forgings, wood, tires

(*Continued on page* 780)

Analysis of 1916 motor truck production, showing the approximate percentage of vehicles of various load capacities



Curve of motor truck production in the United States each year from 1906 to 1916, with an indicated estimate for 1917

Few Changes in Truck Design

Some Expected Developments Arrive But Others Fail to Appear —Light Delivery Machines More Ruggedly Constructed—Hint of Return to Right Steering—Electrical Equipment Gaining Fast

AN analysis of the alterations in truck design made from the specification tables published elsewhere in this issue indicate a settling down in design rather than much that is new. It shows that some tendencies observed a year ago have proved to be permanent, but it also shows that some things which threatened were not true indications. Summing up everything, it is possible to state positively that the main indication is that the engineering of the truck is getting more away from that of the passenger car.

It is especially to be observed that the lightest commercial vehicles are being produced as purely truck designs, although a majority may still be passenger car chassis, which is due to the fact that delivery vehicles are never called upon to sustain such high speeds as are demanded for passenger cars while they are required to cover very much more ground in a day. Ruggedness and greater weight are, therefore, much to be desired for delivery vehicles which are to see severe service.

Two years ago, the 1000-lb. truck was much in the public favor and a great number were built. Some of them were very light and were designed for package work where the weight of the load was a negligible factor and cheapness and speed were the prime requisites. Others were very elaborate and were designed for the severest sort of service, including overloading.

Experience has shown that many of these were used for ¾-ton loads and that their owners preferred them to 1500-lb. cars because they were lighter and cheaper to operate. This has resulted in minor changes in the design of many of these to adapt them to 1500-lb. loads with a corresponding increase in their capacity ratings.

Overloading Less Habitual

Somewhat the same change is noticeable all through the range of capacities, accountable largely to the fact that owners are a little less prone to overloading their vehicles, having learned from experience. Dealers are learning to gage the requirements of buyers better and to recommend fearlessly trucks of ample capacity instead of claiming unreasonable overload capacity for their wares. Manufacturers are building more intermediate capacities so that the owner is not tempted to choose the smaller of two trucks for a load midway between their capacities.

In the design of trucks there have been several contradictory tendencies. For example, after a three-year period during which the left-steering-wheel position came into prominence and bade fair to oust the right drive entirely, this rapid progress has been stayed and a smaller percentage of trucks have left drive for 1917 than was the case for 1916.

Among those who have forsaken left steer either throughout their lines or on their newer models are the makers of the Chase, the Koehler, Krebs, Little Giant, Selden, U. S., Universal and Watson.

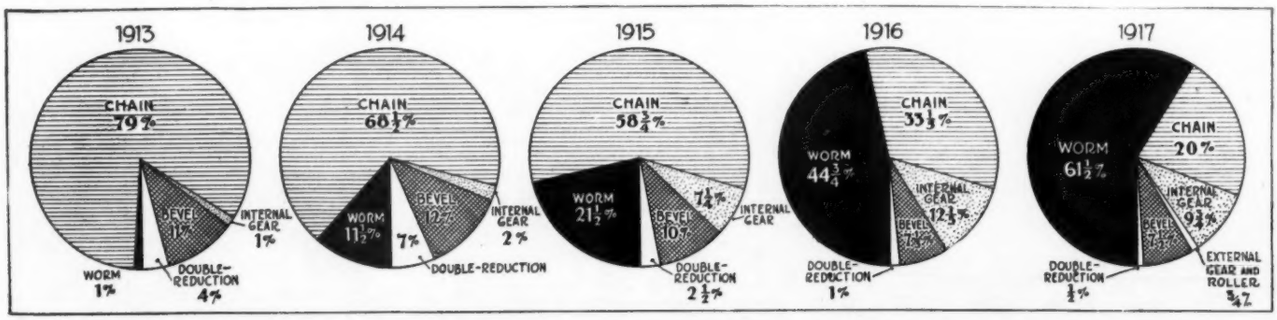
This condition has been influenced to some extent by European orders, which, of course, require right steering, but there has been a well defined insistence on the part of American buyers in some classes for right steering. This is especially the case with those who operate their trucks on country roads, since it is very difficult for the driver of a left-steered truck to determine how closely he may approach the ditch on the right side, and with the present prevalent narrowness of improved country roads and the concealed ditches this argument becomes a weighty one.

Frames More Flexible

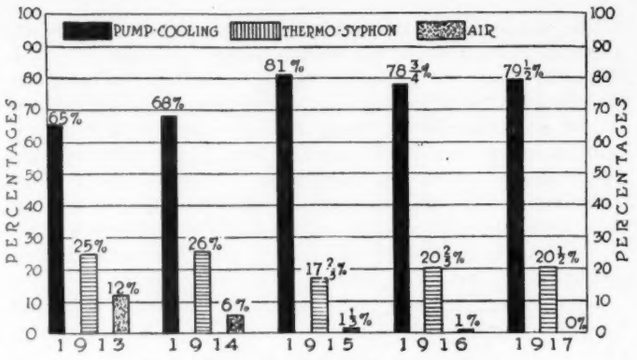
The improvement of truck design has extended even to the framework. In former years few gave any special thought to the frame of a motor truck, deeming that its office was to be strong enough to carry the load and stiff enough to keep the parts in their proper relation. Lately, however, the advantages of the flexible type of construction have been realized to a greater extent, and while many makers still adhere to rigid construction, relying on the springs entirely for compensation for axle movement, there is an increasing number who are adopting the flexible forms. The majority of makers are using what may be termed the semi-flexible form of frame, usually of pressed steel and yielding to severe stresses while remaining stiff against minor ones.

The steel wheel is once more in evidence, this time in a fewer number of forms, the cast type predominating. Doubtless the difficulty of getting wood wheels for part of the time this year has had its influence, but it is safe to predict a growing application of steel wheels to the heavier capacities.

Federal, Gramm-Bernstein, Knox, Republic, Walter and Zeitler & Lamson trucks have recently had steel wheels substituted for wooden ones as standard construction.



Diagrams showing decline of chain drive and rise of worm. Internal gear seems to have replaced the double reduction type meanwhile, and the plain bevel is dying out



Fluctuations in Cooling System Design

In wood wheels, the square spoke is the most popular type, since it affords a wider bearing on the felloe and is actually cheaper to manufacture than the older oval type.

The dual tire, after being outnumbered by the single, on the rear wheel, in the year 1915, has regained its advantage in the 1917 models. This is hard to account for, but no doubt is due to popular prejudice against wide single tires. The single rear tire, however, is gaining, nevertheless, in a way that does not show itself in the tables. Users of trucks all over the country are replacing dual tires with singles and many of the manufacturers who provide dual tires as standard equipment find many users who are willing to pay a slight additional charge for single-tire equipment all around.

Failure of more manufacturers to put large pneumatics on trucks from 1 ton upward is disappointing, although with the great activity and favorable opinion on the part of many of the tire makers there are good grounds for the expectation that before 1918 a number of models of 1½- and 2-ton capacity will appear with pneumatic equipment.

Electric Lighting and Starting Increases

A development which has been long in coming but which may be said to be with us to-day is the provision of automatic starting means for the truck and of electric lights. This comes as an expected development, if not one somewhat overdue. Formerly electric lighting and starting was principally confined to the lighter vehicles, but for 1917, out of thirty-eight manufacturers fitting electric lighting or starting and lighting systems as stock equipment, more than half are of medium to heavy capacity.

Automatic spark advance which it seemed at one time would become prevalent has not progressed of late, due probably to its cost, although appliances of lower cost are being developed. It would also seem a simple matter to use the same centrifugal governor which most trucks use to control the engine speed to take on the extra duty of advancing the spark.

That both hand advance and fixed-spark systems continue to have strong adherents seems to show that each has advantages not possessed by the other, and only combined in the automatic system. The hand advance permits greater economy of fuel if properly handled, than the fixed spark does, and permits the engine to pull better in difficult going. The fixed spark, however, is fool-proof and does not subject the engine to the wasteful abuse incident to improper handling of a hand-spark advance.

Hotchkiss drive has been steadily coming and to-day it is in the majority. There are a number of makers who use Hotchkiss drive, even on 5-ton and 6-ton trucks; but in the majority of instances its use is confined to trucks of medium capacity. This is because the thrust or propulsive duty on the spring assumes such great proportions in a heavy truck that nothing but the best type of spring with especially large and rugged pinning at the driving end can give satisfaction. During the year, several makers have removed radius rods from some of their models, however, due, possibly, to a better understanding of requirements for Hotchkiss drive.

Most of the new makes which have appeared during 1916 have had Hotchkiss drive in addition to which new models of the following makes, most of which formerly employed radius rods or torque members or both, have incorporated drive through the springs: Commerce, Dart, Hurlburt, Jeffery, Kisselkar, Little Giant, Moreland, Old Reliable, Republic, Royal, Selden, Stegeman, Stewart, Tiffin and Wilcox.

Associated with this trend has been development in regard to driveshafts. It has been the ideal of many designers for some time to reduce the truck chassis to the same simplicity which is noticeable in the newer designs of passenger cars, by means of unit power plant grouping of the engine, clutch and gearset and final drive by a single shaft with two universals.

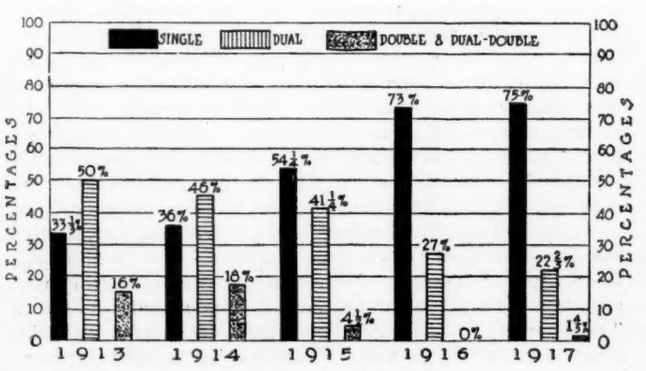
Difficulties, however, have been encountered in the excessive length of such driveshafts due to the long wheelbases possessed by the medium to larger trucks. Passenger car methods cannot be pursued here as small, solid shafts of such length are prone to whip and whirl, rapidly playing havoc with the universals, axle bearings and gearbox bearings. Accordingly much experimenting has been done with shafts made of large-diameter tubing, which with greater strength and little if any greater weight, are much stiffer than solid shafts. Remarkably good results have been achieved on wheelbases of considerable length, but for the longest wheelbases it has so far been imperative that the shaft be cut into two lengths with a stationary bearing between the sections.

Divide Propeller Shaft

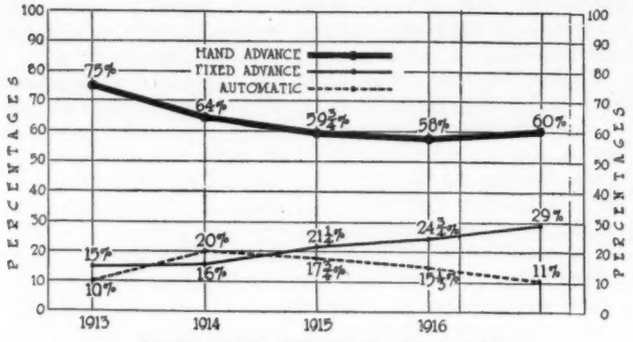
Some makers have provided this bearing at about the middle of a two-part shaft, others splitting the shaft by interposing the gearbox between its two sections. This latter practice has given rise to a decrease in unit powerplant assemblies and increased the percentage of makers who locate their gearsets amidships. Some of these, who have recently brought out new models with amidships gearsets where formerly they favored unit powerplant assembly are: Old Reliable, signal, Wilcox, Dayton and Diamond-T.

The disinclination of the American operator to shift gears more often than avoidable is reflected in the failure of the four-speed gearset to make more progress. It has, in fact, lost slightly in favor of the three-speed, despite the recognized fact that four-speed gearsets give the truck greater ability in difficult going and particularly in hilly country.

Somewhat of the same effect has been accomplished, however, by a slight increase in the size of engines and slightly greater gear reduction. More of the makers than ever are fitting governors, their undoubted tendency to restrict power on the lower speeds being avoided in an increasing number of cases by controlling from the driveshaft instead of the engine or by using the combination drive from both the engine and driveshaft.



Steady gain in single ignition



Hand advance still usual spark control

For example, Armleder, Old Reliable and Service models which formerly did not have governors, have for 1917 been equipped with the driveshaft-driven type. The Couple-Gear and Studebaker, formerly without governors, are now provided with the front-wheel driven type. New models of the Commerce, Globe, Old Reliable and Denmo have driveshaft-driven forms and duplex-driven governors have been adopted recently by Old Reliable, Thomas and Zeitler & Lamson.

During 1916, however, the situation in both the material and labor markets has resulted in sharp increases in the production costs of motor trucks. Prices have not increased in anything like equal proportion with the increased cost of material and labor, in fact, not even in proportion to actual production costs.

Production costs also have not increased as much as costs of material and labor for the reason that with increased production most of the factories have been able to use both more effectively, and particularly labor, and, with a greater output, in many cases with very little increase in overhead, they have been able to afford a smaller margin of profit on each truck, with increased gross earnings notwithstanding.

The range of models of motor trucks continues about as it has been for years past except that there are more of the intermediate capacities, while the average capacity of models produced remains about 2½ tons, as it has been for several years.

In the range of models from less than ½ ton up to 7½ tons and tractors, there is a definite division into two classes, the first being the delivery vehicle class and the second the heavy-duty truck.

The former embraces capacities up to and partially including the 1-tonner and the latter begins with the ¾-tonner and goes up. Production of delivery chassis outnumbers that of trucks two to one, and of the heavier trucks, those which might fall into a medium class, that is, from ¾ to 2 tons, represent a number equal to all of the balance, including tractors.

Light Chassis Means Quantity Production

Hence it is plain that the light chassis business is one of quantity production, and it is easy to understand why 50 per cent of the vehicles are built by 10 per cent of the producers. Delivery vehicles are usually mounted on pneumatic tires, each year witnessing a lesser percentage of chassis in this class equipped with solids. This is because only with pneumatic tires is it possible to run a vehicle at high-delivery speeds, without rapid tire and mechanical depreciation.

Capacities change but little year by year, due to the necessary conservatism in making radical changes in this respect, but a survey of developments in the last 5 years shows that the greatest gains have been made in two intermediate models, the 2½-tonner, a comparatively recent development, and the 3½-tonner which has been gaining steadily for years. The 3-tonner and the ¾-tonner have been losing steadily, since these capacities were set arbitrarily by manufacturers before the industry had built sufficient trucks really to know what was demanded.

The price change this year has only amounted to an average of $137, most of the models being increased but little. It is the trucks of less than ½-ton and of ¾-ton capacity whose prices have undergone the greatest increases because of the abandonment of many antique designs in these capacities in the face of the popular demand for better quality and stamina in the low capacities. These trucks average much higher, but they are also immeasurably better vehicles than were formerly offered, and to-day one may buy a truck of ½- or ¾-ton capacity which will give the same reliable and enduring service as the best of the heavy trucks.

That it has principally been the small to medium assembler who has been obliged to increase his prices is an instructive phase of the situation. This is undoubtedly because the large manufacturers, building a considerable percentage of their trucks in their own plants, such as Packard, Pierce-Arrow, Peerless, Riker and White have been able to secure raw materials sufficiently in advance to prevent any serious shortage, and, making their own parts, have not been affected by the shortage of some of the components occasioned by labor troubles in the plants of parts manufacturers.

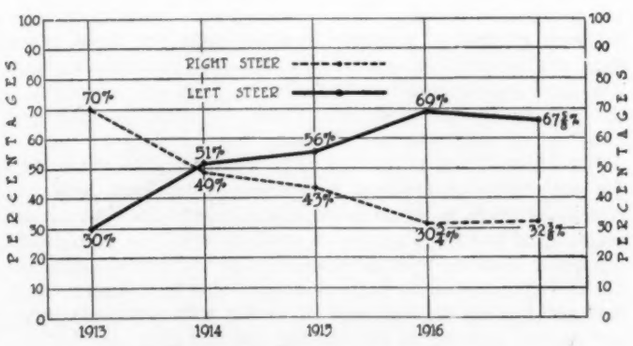
Large Producers Less Affected

The large assemblers have also in most cases escaped serious curtailment of production or delay of deliveries because their orders were of such size as to give them precedence over smaller concerns in the parts markets. Not all the big assemblers have had this good fortune, however, and some have found the supplies of parts too precarious for comfort.

As a possible avoidance of this danger, a few have undertaken to do more manufacturing in their own plants and even the smaller builders have installed more machinery for the simpler machining operations instead of having this work done outside on contract.

It may be questioned whether this is a permanent state of affairs, for the supply difficulty cannot be more than temporary; yet it is argued that a manufacturer of trucks who is equipped for the production of a good many parts is in a stronger position than one who does nothing except assemble his vehicles.

It seems unlikely that the ultimate situation will be an exact parallel of conditions in the passenger car trade, at least not for some years to come. It is going to take a good long time for the parts makers to develop their truck business to vie with their passenger car trade, and design being less fixed makes it harder for them to supply the precise needs of the moment. Thus we see instances of motor truck firms exerting their influence upon the design of the parts they buy. Some have designed engines which they are now having made for them; others have their own ideas in rear axles or universals and so on. Probably this means that the truck manufacturer is doing his best to help the parts maker and this cannot be otherwise than to their mutual advantage.



Right hand steering shows an increase

British Favor Gasoline Tractor

Experiments Being Made in England are Encouraging—Need for Cheap Machines After War

AMERICAN farmers are liable to look upon the diminutive farm of England as more like a garden than a real producer of crops, and to some extent they are right. Still cultivation in England has never been what it might be and there is a great change coming. During the past summer a paper on tractor farming was read by C. B. Fisher before the agricultural section of the British Assn., a scientific body of an eminently practical nature. The following digest of this paper taken from *The Engineer*, London, shows that there is plenty of interest in the subject and suggests a good market for the less expensive American tractors after the war. That there is a splendid market in France is already assured:

"The author claimed that motor traction had now got past the experimental stage, and the present need of the agriculturist was for advice as to the best types of machines to employ for particular cases. Comparisons of different tests under different circumstances on different soils, without further accurate information, both as regards the horse *vs.* mechanical power, of cable *vs.* tractor, or of various makes of machines, were practically worthless. In the first place, the variation of the dynamometer effort required to move different soils was enormous, and it was useless to compare a machine tested on a good soil, on which the pull required for a single-furrow plough, 9 in. wide and 5 in. deep, was approximately 500 lb., with another make of machine ploughing heavy clay, which required generally 1000 lb. pull, but which when really hard and dry would register 1200 lb., and would be heavy work for four horses to one plough.

Steam Plow Costs $15,000

"Equally important was the question of horsepower. Every maker stated the horsepower of his engine, and the intending purchaser compared the price and weight per horsepower of various makes of machines, and possibly the consumption of fuel per horsepower for work done, in order to arrive at their comparative value, but this was worse than useless in the absence of a uniform basis for calculation. It would be of great assistance if some uniform system of rating were adopted and insisted on by the Board of Agriculture for motor tractors. Care should also be taken to base calculations on equal prices for fuel and labor. The cost of a set of steam ploughing and cultivating tackle was about $15,000, and although the life of it was from 20 to 30 years, it was an outlay too heavy for the individual farmer.

"The author's personal experience had been acquired with a 20-brake-hp. universal tractor, made by Saunderson and Mills,* and the only appliance specially purchased to go with it was a three-furrow plough, all the others being the ordinary farm implements with the attachments altered. The duties to which the tractor was put were ploughing, threshing, and hauling. In ploughing three furrows the fuel consumption was 3 to 4 gal. of kerosene, 1 qt. of gasoline, and 3 pt. of lubricating oil to the acre. Threshing operations with a full-sized machine, with straw trusser attached, or the engine working the elevator, took approximately 2 gal. of kerosene an hour, 1 qt. of gasoline, and 3 pt. of lubricating oil per day, and the owners recently threshed one rick of oats, 66 quarters, in one day. The motor tractor showed a saving as compared with the ordinary method of threshing of 28 cents per quarter, and, in addition, it drew water. There would be a less saving when threshing wheat, but it might be taken at 12 cents a quarter. There was an enormous advantage in having the machine always ready when required, and only those who had formerly hired threshing machines could fully appreciate the benefit. The tractor had displaced horses for hauling. It would draw 5 tons at 5 m.p.h. on the road, doing three journeys, totaling 18 miles a day, on about 7 gal. of kerosene.

*A British machine.

Uses 1 Gallon per Acre

"The use of the tractor with self-binders was a striking illustration of its satisfactory employment. Two binders, which were easily pulled by the tractor, would call for the use of twelve horses for a full day's work. With the motor tractor and two binders up to 30 acres could be cut in a day, and the kerosene consumption was about 1 gal. per acre. The tractor had been used with equally satisfactory results for scuffling, rolling, and harrowing, and he had no doubt it could be used for drilling and mowing. He believed that Mr. Saunderson, the maker of the machine, had recently purchased a heavy clay land farm of 240 acres in Bedfordshire, which was being entirely operated by motor power, for experimental purposes. The full statistics were to be published shortly.

"With regard to the life of a high-speed engine employed on farm work, while much depended on the person who had charge, he would be inclined to base calculations for depreciation on a period of 6 years. He had referred to only one type, of which he had personal experience, but he believed that the value of other makes had been demonstrated. The motor ploughs in use were the Fowler-Wyles, the Wyles, the Martin, and the Crawley, which ranged in power from 10 to 30 hp. The tractors available were Weeks' Dungey Simplex, Big Bull, Mogul, Daimler, Universal, Sanduskey, Overtime, Ivel, Fairbanks Morse, Emerson and Omnitractor. The best known steam tractors were the Mann and the Ransome. He knew the users of some of the different makes, and in no case, under present circumstances, had they regretted their purchase. There was difficulty, however, in obtaining delivery, particularly of English machines.

Criticizes American Design

"British makers had made a particular study of the requirements of the agriculturist. One particular feature in which many of the American machines were lacking, was their unsuitability for haulage. He was personally in favor of a 20 to 25-brake-hp. engine for the farm machine. It should weigh from about 3920 lb. up to about 5600 lb., and should cost from $1,250 to $1,750. It should be fitted with three speeds forward and reverse. The motor tractor opened up possibilities of solving the question of reconverting the strong wheat land to its proper purpose, and thereby increasing the power of employment. It could and would raise the standard of wages by turning the agricultural laborer into a skilled mechanic. If the nation had decided that one of the chief lessons of the war was the necessity for a greater production of foodstuffs at home, the makers of motor tractors had a great opportunity of supplying the needs of the agriculturist. The farmer, before outlay of capital, would, however, require some stability in the price of wheat.

Military Truck a Complicated Problem

America Faces a Problem Quite Different from That of Any European Nation—Admixture of Engineering and Commercial Questions Makes Ultimate Solution Difficult to Forecast

By A. Ludlow Clayden

IN deciding originally upon its so-called "subsidy" specifications for motor trucks the British government called well known engineers into conference, and this plan is to be continued after the war in settling the future of military motor trucks.

There are two powerful organizations in England corresponding almost exactly to the S. A. E. and to the N. A. C. C., these being the Institution of Automobile Engineers and the Society of Motor Manufacturers and Traders. It has just been announced that all future research work relating to automobiles for government service of any kind will be taken care of by a committee having its membership made up mainly of representatives of the I. A. E. and the S. M. M. and T. with the addition of some officials directly appointed by the government.

It is common talk in England that this new committee will be started on its work before very long, and that its first task will be to draft specifications for military trucks down to the last cotter pin, determining the designs from the vast stores of experience gained in France and elsewhere during the past two years.

It is possible for a great military power to specify in this sort of way, to own huge fleets of vehicles and to hand out drawings to which manufacturers who want to contract may work; just as can be done with parts of guns or with shell and fuses, but there is a danger in adopting this system in that it may convert the military truck from a commercial article into a specialized one, which would make it just as hard to buy in large quantities suddenly as it has been for the Entente powers to buy munitions at home or abroad without immense delays while shops were being equipped for unaccustomed work.

America is not likely to become a military power within any time that need be considered at present, so whether or not a standard design of military truck down to the last nut is advisable for England, its advisability for America is very debatable indeed. An army suddenly faced with war has two desires in motor transportation. It wants as few types of truck as possible and would appreciate having only one design for each size, but it also wants quantities of trucks and wants them instantly.

Striking a Happy Mean

To get trucks in quantities without warning means that the regular product must be accepted, and this is just the situation the American army authorities had to face last summer when the call came to the Mexican border. France and England did the same thing in 1914, but since their governments have been taking nearly all the mechanical output of the two countries, it has been possible to concentrate manufacturers on special types. In Coventry to-day, for example, one automobile maker is now building chassis to the drawings of a rival firm, the latter having been ordered to produce only aeroplane engines for the time being.

It is the desire, and the very wise intention, of the United States army authorities to try to evolve a scheme which will eliminate the worst of the troubles and confusion from which they have suffered, without limiting the possible market so much that, in case of emergency, they could not obtain rapid delivery of large quantities. The Mexican experience has shown that certain things most vitally need to be standardized for interchangeability. Radiators, for example, however they may differ in detail construction, ought to fit all trucks of any one rated size. The mounting and the position of the water pipes should be absolutely limited, so that any radiator would go on any truck.

Of a different sort is the requirement that control should be standard, so that any driver would be at home on any truck, but this is almost as important, and there are scores of similar little things which can be standardized without limiting the engineering scope of any truck manufacturer.

The old British scheme was to specify just such things as these and to pay a small yearly sum to every user who bought and operated a truck with the standardized details, and most of the truck manufacturers of England found it paid to produce "subsidy type" vehicles. They found it easily possible to make these to designs which hardly appeared to have any similarity at a casual glance, and the standards were incorporated in trucks of all prices. When war came some of the standards proved good and some less desirable, but the scheme itself was vindicated, although it had not been in operation long enough for there to be any appreciable quantity of subsidy type trucks in existence by the outbreak of war.

Subsidy Not Wanted in America

The idea in granting the subsidy was to encourage the production of trucks acceptable to the army, but it may be questioned whether such encouragement is really necessary. If a manufacturer is not handicapped in any way by using specified dimensions for certain portions of his truck he would benefit the ordinary user by adopting them. We all know now that a truck with tires that are not standard size is an absurdity; we are accustomed to the use of a standard tread; the absence of a spark plug standard would produce incalculable trouble and so on.

Still there is a limit beyond which we cannot go without beginning to lose as much as we gain and the striking of a happy medium between too much standardization and not enough of it is a task which is going to tax the powers of many a committee in the next five or six years. The problem is one that will always be present, since improving knowledge will call for alterations in design and thereby every now and then we shall discover that some accepted standard has to be changed.

A military wagon can be designed with some reliance that it will be just as good 20 years hence as it is now, for there is little left to learn about horse-drawn vehicles, but motor truck specifications will have to be revised at least each third year, if the army is to keep itself supplied with the best obtainable for its purpose. This makes the situation quite complicated, and renders it very hard to steer the proper

course, but there is no question whatever that the U. S. army is proceeding along the right lines and that it will be as well served by the industry as it could possibly be as long as the present methods continue in use, and they are not likely to be altered very much.

The armies of the world have been slow to realize that the coming of motor transport has created an entirely novel situation. Previously everything which was needed by an army was either an entirely special product, such as guns and ammunition, or else an entirely ordinary one such as food, boots and clothing. When it comes to motor trucks, however, at the present time the army needs something a little different from the commercial product, but not so different that the making of it is an industry in itself as is the case of guns and munitions.

The statement that the military truck is to differ from the commercial is still debatable. It is quite possible that when definite conclusions have been reached as to what should be the specifications of a military vehicle we shall find it is also an excellent machine for the uses of commerce, but there is as yet no evidence which will enable this matter to be decided.

In England, at the outbreak of the war, the subsidy system had been in operation so short a time that there were only a few subsidy type vehicles in the hands of private users. The time elapsing between the delivery of the first few subsidy trucks and the date when they were called in for military service was too short to enable their suitability for commercial work to be gaged accurately. Since that time war service has shown that the subsidy vehicle is not necessarily ideal for military work.

In France, although there was a subsidy scheme it was not developed even so far as the British one. In Germany the total number of different makes of truck was very small, so that the effect of the German subsidy system was really to provide large fleets of a small number of designs. Thus we cannot find in Europe any parallel to America.

(*Continued on page* 757)

A Directory of Motor Truck Makers

211 Manufacturers of Commercial Vehicles for 1917— 200 Gasoline—Two Steam and Nine Electric— Models Made in Tons Capacity

Name	Manufacturer	Address	MODELS IN TONS CAPACITY *Figures refer to capacity, not number of models*														
			Under ½	½	¾	1	1½	2	2½	3	3½	4	5	5½	6	6½	7 and over
Gasoline Vehicles																	
A. & B	American & British Mfg. Co	Providence, R. I								3			5				
Acason	Acason Motor Truck Co	Detroit, Mich						2			3½						
Acme	Cadillac Auto Truck Co	Cadillac, Mich				1		2			3½						
Allis-Chalmers	Allis-Chalmers Mfg. Co	Milwaukee, Wis											5				
American	American Motor Truck Co	Hartford, Conn						2									
Armleder	O. Armleder Co	Cincinnati, Ohio						2			3½						
Atlas	Martin Carriage Wks	York, Pa		½													
Atterbury	Atterbury Motor Car Co	Buffalo, N. Y				1	1½	2			3½						
Autocar	Autocar Co	Ardmore, Pa					1½	2									
Available	Available Truck Co	Chicago, Ill				1		2			3½		5				
Avery	Avery Co	Peoria, Ill				1		2		3			5				
Barker	C. L. Barker	Norwalk, Conn				1		2									
Bauer	Bauer Machine Wks. Co	Kansas City, Mo		½	¾												
Beech Creek	Beech Creek Truck & Auto Co	Beech Creek, Pa								3							
Bell	Bell Motor Car Co	York, Pa		¾													
Bessemer	Bessemer Motor Truck Co	York, Pa				1		2			3½		5				
Blair	Blair Motor Truck Co	Newark, Ohio						2		3		4	5				
Bourne	Bourne Magnetic Truck Co	Philadelphia, Pa															
Brinton	Chester County Motor Co	Coatesville, Pa			¾				2½								
Briscoe	Briscoe Motor Co	Jackson, Mich		½													
Brockway	Brockway Motor Truck Co	Cortland, N. Y				1	1½	2			3½						
Brown	Brown Carriage Co	Cincinnati, Ohio		½													
Bulkley-Rider	Bulkley-Rider Tractor Co	Los Angeles, Cal															T
Burford	H. E. Burford Co	Fremont, Ohio						2			3½						
Carlton	Carlton-Hill Motor Car Co	Rutherford, N. J															
Casey	F. A. Casey	Billerica, Mass		½													
Chase	Chase Motor Truck Co	Syracuse, N. Y				1	1½		2½	3	3½						
Clyde	Clyde Motor Truck Co	Farmingdale, L. I															
Coleman	Coleman Carriage & Harness Co	Ilion, N. Y						2		3							
Collier	Collier Motor Truck Co	Painesville, Ohio			¾												
Columbia	Columbia Motor Truck & Trailer Co	Pontiac, Mich						2									
Commerce	Commerce Motor Car Co	Detroit, Mich			¾	1											
Comet	Comet Automobile Co	Rockford, Ill		½													
Continental (C)	Continental Motor Truck Co	Chicago, Ill				1	1½	2			3½						
Corbitt	Corbitt Automobile Co	Henderson, N. C					1½	2	2½		3½						
Corliss	Corliss Motor Truck Co	Corliss, Wis		½													
Couple-Gear	Couple-Gear Freight Wheel Co	Grand Rapids, Mich									3½		5				
Crawford	Crawford Automobile Co	Hagerstown, Md								3							
Croce	Croce Automobile Co	Asbury Park, N. J		½													
Crown	Crown Commercial Car Co	North Milwaukee, Wis			¾		1½		2½								
Crowther-Duryea	Crowther Motor Co	Rochester, N. Y		¾													
Dain	Dain Mfg. Co	Ottumwa, Iowa				1											
Dart	Dart Motor Truck Co	Waterloo, Iowa			¾		1½		2½								
Dayton	Durable Dayton Truck Co	Dayton, Ohio						2			3½		5				7½

Heavy type represents vehicles whose specifications are given in this issue.

A Directory of 211 Manufacturers of Gasoline, Steam

Name	Manufacturer	Address	MODELS IN TONS CAPACITY (Figures refer to capacity, not number of models)													
			Under ½	½	¾	1	1½	2	2½	3	3½	4	5	5½	6	6½	7 and over
D-E	Day-Elder Motors Co.	Newark, N. J.		½													
DeKalb	DeKalb Wagon Wks. Co.	DeKalb, Ill.						2	2½								
Denby	Denby Motor Truck Co.	Detroit, Mich.				1	1½	2	2½								
Denmo	Denneen Motor Co.	Cleveland, Ohio.				1½											
Diamond-T	Diamond-T Motor Car Co.	Chicago, Ill.		½													
Dispatch	Dispatch Motor Car Co.	Minneapolis, Minn.			¾		1½	2			3½						
Doane	Doane Motor Truck Co.	San Francisco, Cal.		½													
Dominion	Dominion Motor Truck Co.	Detroit, Mich.							2½						6		
Dornfield	John Dornfield Co.	Watertown, Wis.													6		T
Dorris	Dorris Motor Car Co.	St. Louis, Mo.			½			2									
Duplex	Duplex-Power Car Co.	Charlotte, Mich.						2		3							
Ellsworth	Mills-Ellsworth Co.	Keokuk, Iowa.		½													
Erie	Erie Motor Truck Mfg. Co.	Erie, Pa.															
Fargo	Fargo Motor Car Co.	Chicago, Ill.				1		2									
Fawick	Fawick Motor Car Co.	Sioux Falls, S. D.		½	¾	1		2									
Federal	Federal Motor Truck Co.	Detroit, Mich.				1	1½	2			3½		5				
Forschler	Forschler Wagon Co.	New Orleans, La.				1		2									
Ford	Ford Motor Co.	Detroit, Mich.				1											
Frome	R. L. Frome Mfg. Co.	Sheboygan, Wis.															
F. W. D.	Four Wheel Drive Auto Co.	Clintonville, Wis.					1½			3			5				
Gabriel	Gabriel Auto Co.	Cleveland, Ohio			¾	1	1½										
Garford	Garford Motor Truck Co.	Lima, Ohio				1	1½	2			3½		5		6		
Gary	Gary Motor Truck Co.	Gary, Ind.			¾	1	1½	2									
G. A. Schacht	G. A. Schacht Motor Truck Co.	Cincinnati, Ohio					1½	2		3							
Geneva	Geneva Wagon Co.	Geneva, N. Y.			¾												
Gersix	Gerlinger Motor Car Co.	Portland, Ore.							2½								
Globe	Globe Furniture Co.	Northville, Mich.				1½											
G. M. C.	General Motors Truck Co.	Pontiac, Mich.			¾	1	1½	2			3½		5				
Gramm-Bernstein	Gramm-Bernstein Co.	Lima, Ohio.				1	1½	2	2½		3½		5		6		
Great Southern	Great Southern Automobile Co.	Birmingham, Ala.						2				4					
G. V.-Mercedes	General Vehicle Co.	Long Island City, N. Y.													6		
Hahn	Hahn Motor Truck Co.	Hamburg, Pa.				1		2									
Hall	Lewis-Hall Iron Wks.	Detroit, Mich.						2			3½		5				
Harrison	Robert Harrison Co.	South Boston, Mass.									3½						
Harvey	Harvey Motor Truck Co.	Harvey, Ill.						2			3½		5				
Hawkeye	Hawkeye Mfg. & Repair Co.	Sioux City, Iowa.				1½											
Henderson	Henderson Bros.	North Cambridge, Mass.		½		1											
Hercules	Hercules Motor Truck Co.	South Boston, Mass.															
Horner	Detroit-Wyandotte Motor Co.	Wyandotte, Mich.					1½	2		3			5				
Hurlburt	Hurlburt Motor Truck Co.	New York City.					1½	2			3½		5				7
I. H. C.	International Harvester Corp.	Akron, Ohio.			¾	1											
Independent	Independent Motors Corp.	Port Huron, Mich.				1		2									
Indiana	Indiana Truck Co.	Marion, Ind.				1	1½			3			5				
Inter-State	Inter-State Motor Co.	Muncie, Ind.	¾														
Iowa	Iowa Motor Truck Co.	Ottumwa, Iowa.				1	1½										
Jeffery	Nash Motors Co.	Kenosha, Wis.			¾		1½	2									
Kearns	Kearns Motor Car Co.	Beavertown, Pa.		½													
Kelly-Springfield	Kelly-Springfield Motor Truck Co.	Springfield, Ohio.					1½		2½		3½	4	5		6		
King	A. R. King Mfg. Co.	Kingston, N. Y.									3½						
KisselKar	Kissel Motor Car Co.	Hartford, Wis.			¾	1		2	2½			4	5				
Kleiber	Kleiber Co., Inc.	San Francisco, Cal.				¾	1½	2	2½		3½		5				
Knickerbocker	Knickerbocker Motor Truck Co.	New York City.									3½		5				
Knox	Knox Motors Co.	Springfield, Mass.								3							T
Koehler	H. J. Koehler Motors Corp.	Newark, N. J.				1											
Koenig & Luhrs	Koenig & Luhrs Wagon Co.	Quincy, Ill.															
Krebs	Krebs Commercial Car Co.	Clyde, Ohio.					1½	2			3½						
Kressler	Kressler Auto Co.	Fostoria, Ohio.		½													
Lambert	Buckeye Mfg. Co.	Anderson, Ind.				1											
Landshaft	William Landshaft & Son.	Chicago, Ill.				1		2									
Lane	Lane Motor Truck Co.	Kalamazoo, Mich.			¾												
Lange	Lange Motor Truck Co.	Pittsburgh, Pa.					1½		2½								
Larrabee	Larrabee-Deyo Motor Truck Co.	Binghamton, N. Y.				1	1½		2½								
Lawson	Lawson Mfg. Co.	Pittsburgh, Pa.		½													
Lenox	Lenox Motor Car Co.	Boston, Mass.															
Lima	Lima Light Car Mfg. Co.	Lima, Ohio.		½													
Lincoln	Lincoln Motor Truck Co.	Detroit, Mich.				1											
Lippard-Stewart	Lippard-Stewart Motor Car Co.	Buffalo, N. Y.		½	¾	1	1½	2									
Little Giant	Chicago Pneumatic Tool Co.	Chicago, Ill.			¾	1	1½	2									
Lombard	Lombard Auto Tractor-Truck Corp.	New York City.											5				
Lord Baltimore	Lord Baltimore Motor Truck Co.	Baltimore, Md.				1		2									
Maccar	Maccar Co.	Scranton, Pa.					1½		2½		3½			5½			
Mack	International Motor Co.	New York City.				1	1½	2			3½			5½			7½
Manly	Manly Motor Corp.	Chicago, Ill.					1½		2½								
Maxwell	Maxwell Motor Co.	Detroit, Mich.	½														
Menominee	D. F. Poyer Co.	Menominee, Mich.			¾	1	1½	2			3½						
Mercury-Bulley	Mercury Mfg. Co.	Chicago, Ill.															T
Metropolitan	Metropolitan Motors, Inc.	New York City.															
Metz	Metz Co.	Waltham, Mass.															
Modern	Bowling Green Motor Car Co.	Bowling Green, Ohio.		½													
Mogul	Mogul Motor Truck Co.	St. Louis, Mo.				1	1½	2			3½						
Moon	Jos. W. Moon Buggy Co.	St. Louis, Mo.					1½	2	2½		3½						
Moreland	Moreland Motor Truck Co.	Los Angeles, Cal.					1½										
Morton	Morton Truck & Tractor Co.	Harrisburg, Pa.				1	1½		2½			4	5				
Nelson & LeMoon	Nelson & LeMoon.	Chicago, Ill.								3							
Netco	New England Truck Co.	Fitchburg, Mass.				1		2		3							
New York	Tegetmeier & Reipe.	New York City.						2									
Niles	Niles Car & Mfg. Co.	Niles, Ohio.					1½										
						1		2									
Old Hickory	Kentucky Wagon Mfg. Co.	Louisville, Ky.		½													
Old Reliable	Old Reliable Motor Truck Co.	Chicago, Ill.					1½	2	2½	3		4	5				7
Overland	Willys-Overland Co.	Toledo, Ohio.	¾	¾													

Heavy type represents vehicles whose specifications are given in this issue.

and Electric Commercial Vehicles for 1917—Continued

Name	Manufacturer	Address	MODELS IN TONS CAPACITY (Figures refer to capacity, not number of models)													
			Under ½	½	¾	1	1½	2	2½	3	3½	4	5	5½	6	6½	7 and over
Packard	Packard Motor Car Co.	Detroit, Mich.				1	1½	2		3		4					
Packet	Packet Motor Truck Co.	St. Paul, Minn.	¾														
Palmer	Palmer-Meyer Motor Car Co.	St. Louis, Mo.				1		2									
Palmer-Moore	Palmer-Moore Co.	Syracuse, N. Y.			¾	1											
Paulding	Anchor Auto Co.	St. Louis, Mo.			¾	1	1½	2									
Peerless	Peerless Motor Car Co.	Cleveland, Ohio						2		3		4	5				
Pennsy	Pennsy Motors Co.	Pittsburgh, Pa.		½													
Phoenix Centiped	Phoenix Mfg. Co.	Eau Claire, Wis.											5				
Pierce-Arrow	Pierce-Arrow Motor Car Co.	Buffalo, N. Y.						2					5				
Pullman	Pullman Motor Car Co.	York, Pa.		½													
Rainier	Rainier Motor Corp.	New York City		½													
Reo	Reo Motor Car Co.	Lansing, Mich.			¾			2									
Republic	Republic Motor Truck Co.	Alma, Mich.			¾	1	1½	2		3							
Riker	Locomobile Co.	Bridgeport, Conn.								3		4					
Robinson	Robinson Fire Apparatus Co.	St. Louis, Mo.															T
Robinson	Golden West Motors Co.	Sacramento, Cal.						2									
Rocco	Rocco Motor Co.	Hannibal, Mo.															
Rowe	Rowe Motor Truck Co.	Downington, Pa.				1		2		3			5				
Royal	Royal Motor Truck Co.	New York City				1		2			3½		5		6		7
Rush	Rush Motor Truck Co.	Philadelphia, Pa.		½													
Salvador	Mansur Motor Truck Co.	Haverhill, Mass.						2									
Sandow	Sandow Motor Truck Co.	Chicago Ill.					1½	2		3							
Sanford	Sanford Motor Truck Co.	Syracuse, N. Y.				1	1½	2									
Saurer	International Motor Co.	New York City											5			6½	
Schleicher	Schleicher Motor Vehicle Co.	New York City								3			5				
Selden	Selden Motor Vehicle Co.	Rochester, N. Y.			¾	1		2			3½						
Service	Service Motor Truck Co.	Wabash, Ind.				1	1½	2			3½		5				
Signal	Signal Motor Truck Co.	Detroit, Mich.				1	1½	2			3½		5				
Sphinx	Sphinx Motor Car Co.	York, Pa.		½													
Standard	Standard Motor Truck Co.	Detroit, Mich.						2			3½	4	5				
States	States Motor Co.	Kalamazoo, Mich.		½													
Steele	W. M. Steele	Worcester, Mass.						2		3		4	5				
Stegeman	Stegeman Motor Car Co.	Milwaukee, Wis.					1½		2½		3½		5				
Sterling	Sterling Motor Truck Co.	Milwaukee, Wis.							2½		3½		5				7
Stewart	Stewart Motor Corp.	Buffalo, N. Y.	½	¾	1¼												
Studebaker	Studebaker Corp.	Detroit, Mich.	½		1												
Sullivan	Sullivan Motor Car Co.	Rochester, N. Y.					1½	2									
Superior	E. G. Willingham's Sons	Atlanta, Ga.				1		2									
Thomas	Thomas Auto Truck Co.	New York City							2½								
Tiffin	Tiffin Wagon Co.	Tiffin, Ohio			¾	1	1½		2½				5		6		
Tower	Tower Motor Truck Co.	Greenville, Mich.						2									
Transit	Transit Motor Car Co.	Louisville, Ky.				1		2			3½		5				
Transport	Transport Tractor Co.	Long Island City, N. Y.											5				
Tulsa	Tulsa Auto & Mfg. Co.	Tulsa, Okla.															
Twin City	Brasie Motor Car Co.	Minneapolis, Minn.				1		2									
Union	Union Motor Truck Co.	Bay City, Mich.							2½								
United	United Motors Co.	Grand Rapids, Mich.						2			3½	4	5				
Universal	Universal Service Co.	Detroit, Mich.					1½	2		3							
U. S.	United States Motor Truck Co.	Covington, Ky.						2		3	3½		5				
Van	Van Motor Truck Co.	Newburgh, N. Y.															
Van Winkle	Van Wink e Motor Truck Co.	Atlanta, Ga.															
Velie	Veile Motor Vehicle Co.	Moline, Ill.						2			3½						
Vim	Vim Motor Truck Co.	Philadelphia, Pa.		½													
Volta	Volta Bros.	Chicago, Ill.								3			5				
Walter	Walter Motor Truck Co.	New York City									3½						7½
Watson	Watson Wagon Co.	Canastota, N. Y.											5				
Ware	Twin City Four Wheel Drive Co.	St. Paul, Minn.								3							
Washington	Washington Motor Car Co.	Hyattsville, Md.											5		6		7
White	White Co.	Cleveland, Ohio			¾		1½			3			5				
Wichita	Wichita Falls Motor Co.	Wichita Falls, Tex.				1	1½	2	2½		3½		5				
Wilcox	H. E. Wilcox Motor Co.	Minneapolis, Minn.			¾	1	1½	2			3½						
Wilson	J. C. Wilson Co.	Detroit, Mich.						2									
Wisconsin	Myers Machine Co.	Sheboygan, Wis.				1½			2½								
Witt-Will	Witt-Will Co.	Washington, D. C.				1		2									
W-S	Weier-Smith Truck Co.	Birmingham, Mich.							2½								
Zeitler & Lamson	Zeitler & Lamson Truck Co.	Chicago, Ill.					1½		2½		3½		5				

Steam Vehicles

Stanley	Stanley Motor Carriage Co.	Newton, Mass.			¾	1½										
Titan	American Machine Co.	Newark, Del.														

Electric Vehicles

Atlantic	Atlantic Vehicle Co.	Newark, N. J.				1		2			3½		5			
Couple-Gear	Couple-Gear Freight Wheel Co.	Grand Rapids, Mich.									3½		5			7
C. T.	Commercial Truck Co.	Philadelphia, Pa.		½		1		2			3½		5			
G. V.	General Vehicle Co.	Long Island City, N. Y.		½		1		2			3½		5			
Lansden	Lansden Co.	Brooklyn, N. Y.	¼	½		1		2			3½		5			T
Old Hickory	Kentucky Wagon Mfg. Co.	Louisville, Ky.				1										
Urban	Kentucky Wagon Mfg. Co.	Louisville, Ky.			¾		1½		2½			4				
Walker	Walker Vehicle Co.	Chicago, Ill.		½		1		2		3		4	5			
Ward	Ward Motor Vehicle Co.	Mount Vernon, N. Y.	¼	½		1		2			3½		5			

Heavy type represents vehicles whose specifications are given in this issue.

Prices of 1917 Gasoline Motor Trucks

Classified According to Load Capacity and Combined with Salient Features of Chassis

TRUCKS UNDER ½-TON CAPACITY

Name and Model	Chassis Price	Wheelbase, Inches	Tires	N.A.C.C. Horsepower	Electric System	Gearset Type	Final Drive
Maxwell 25	$535	103	pneu	21.08	s&l	selec	bevel
Overland 75-B	625-c	104	pneu	18.21	s,l&i	selec	bevel
Packet	350	100	pneu	12.08	none	frict	dbl chn

TRUCKS OF ½-TON CAPACITY

Atlas 17	$690	106	pneu	16.92		selec	sp-bev
Briscoe 4-24	625	104	pneu	16.92	s,l&i	selec	bevel
Corliss A	800-c*	100	pneu	15.64		selec	bevel
Croce 17	825	108	p&s	16.92		selec	bevel
Crowther-Duryea	600-c	110	pneu	22.50	s,l&i	roller	roller
D-E Junior	895	108	pneu	15.64	s&l	selec	top worm
Dispatch G	1,150	120	pneu	22.50	s&l	fric	dbl chn
Ellsworth 25-A	695-c	108	pneu	16.92	s,l&i	selec	bevel
Lawson 35		112	pneu	22.50	s&l-2	selec	bevel
Lippard-Stewart MW	1,000	106	pneu	16.92	s&l-2	selec	top worm
Old Hickory	825	112	pneu	16.92	s&l-2	selec	bevel
Overland 75-B	725	106	pneu	27.20	s,l&i-2	selec	bevel
Pennsy 15	660	98	pneu	27.20		selec	bevel
Pullman 4-24		114	pneu	22.50	s&l-2	selec	bevel
Rainier	850	115	pneu	16.92	s&l	selec	top worm
Rush D	695	105	pneu	16.92	s&l-2	selec	bevel
Stewart 5	695	106	pneu	14.40	none	selec	int-gear
Studebaker SF	785	112	pneu	24.22	s&l-2	selec	bevel
Vim 20	635	102	pneu	14.40		selec	bevel

TRUCKS OF ¾-TON CAPACITY

Brinton H	$950	115	pneu*	16.92	lighting	selec	top worm
Collier M	800	118	pneu	16.92	s,l&i	selec	bevel
Commerce N	975-c	120	pneu	19.61	s,l&i	selec	bevel
Dart BB	1,200	124	solid	19.61	none	selec	top worm
Dorris I-B-4	1,900	132	pneu	30.65	lighting	prog	sp-bev
Geneva 1		96	solid	22.10		plan	dbl chn
G.M.C 15	1,090	122	pneu	19.61	none	selec	bevel
I.H.C H	1,225	115	solid	19.61	s&l*	selec	int-gear
Jeffery 1016	965	116	pneu	22.50	s&l-2	selec	sp-bev
Kisselkar	950	124	pneu	24.22	s&l-2*	selec	sp-bev
Kleiber AA	1,600	130*	solid*	22.50	lighting	selec	top worm
Lane A	1,075	120	solid*	16.92		selec	top worm
Lippard-Stewart W	1,600	125*	pneu	22.50	s&l	selec	top worm
Little-Giant 15	1,500	138	p&s	19.61	lighting	selec	top worm
Menominee EW	1,295	124	cush	22.50	none	selec	top worm
Palmer-Moore K	1,150	106	solid	19.61	s&l*	selec	int-gear
Reo F	1,000	120	pneu	27.20	s&l-2	selec	sp-bev
Republic 9	750	120	cush	16.92	lighting	selec	int-gear
Selden G	985	110	pneu	15.64	s&l	selec	top worm
Stewart 3	1,290	118	pneu	19.61	s&l-2	selec	int-gear

TRUCKS OF ¾-TON CAPACITY (Cont'd)

Tiffin A	$1,190	110	pneu*	19.61	none	selec	int-gear
White GBBE	2,100	133½	pneu	22.50	s&l	selec	bevel
Wilcox M	1,200	120	pneu	19.61	lighting	selec	top worm

TRUCKS OF 1-TON CAPACITY

Acme B	$1,500	128	pneu*	19.61	s,l&i	selec	top worm
Atterbury 6B	1,775	140½	solid	22.50		selec	top worm
Available 1	1,700	132*	solid	22.50		selec	top worm
Avery C	1,690	128	solid	27.20		selec	dbl chn
Bessemer G	975	124	solid	19.61		selec	int-gear
Brockway O	1,450	124*	solid*	19.61		selec	top worm
Chase A	1,650		solid	19.61		selec	top worm
Commerce E	1,175	126	solid	19.61	s&l-2	selec	int-gear
Continental (C) FL	1,550	144	solid	22.50		selec	top worm
D-E Senior	1,450	128*	solid	19.61		selec	top worm
Denby R	990	119	pneu	15.64	s&l	selec	int-gear
Denmo 10	1,385	124	p&s*	22.50	s&l-2	selec	int-gear
Diamond-T J5	1,485	132	solid	19.61		selec	top worm
Federal S		132	solid*	19.61	s,l&i*	selec	top worm
Forschler	1,650	130	solid*	19.61	none	selec	top worm
Garford 75	1,450	120	p&s	19.61	s&l	selec	top worm
Globe	1,375	130*	solid	25.39		selec	int-gear
G.M.C 21		136	solid	22.50	none	selec	top worm
Gramm-Bernstein	1,650	124*	solid	22.50	s&l-2*	ind-c	top worm
Hahn C	1,750	136*	solid	27.20		selec	top worm
Hawkeye H	1,300	136*	solid	22.50		selec	int-gear
I.H.C F	1,500	128*	solid	19.61	s&l*	selec	int-gear
Independent F	1,385	128*	solid*	19.61	s,l&i	selec	top worm
Kisselkar	1,250	132	solid*	24.22	s&l-2*	selec	top worm
Koehler K	895	129	solid	19.61	none	selec	int-gear
Lambert V2	1,700	144	solid	29.00	s&,li	fric	dbl chn
Larrabee	1,550	130	solid*	22.50	s,l&i	selec	top worm
Lincoln L	975	122*	pneu	19.61	s,l&i	selec	bevel
Lippard-Stewart H	2,000	145	solid	22.50	s&l	selec	top worm
Little Giant H	1,400	110	solid	19.61			dbl chn
Mack AB	2,000	144*	solid	25.60	s&l-2	selec	dbl chn
Mack AB	2,000	144*	solid	25.60	s&l-2	selec	top worm
Menominee FW	1,575	130*	solid	22.50	none	selec	top worm
Moreland 15-D	1,650	126	solid	22.50	lighting	selec	top worm
Nelson & LeMoon E1	1,700	opt	solid	22.50		selec	top worm
Niles B	1,175	124	pneu	19.61	opt	selec	top worm
Packard 1-D	2,200	126*	solid	25.60	s&l-2	prog	top worm
Palmer	1,350	132½	solid	22.50	none	selec	int-gear
Palmer-Moore M	1,350	126	solid	22.50	s&l*	selec	int-gear
Republic 10		124	solid	19.61	s&l-2	selec	int-gear
Royal		124*	solid	16.92	starting	ind-c	top worm
Sanford O	1,290	120	pneu*	19.61		selec	int-gear
Selden TL	1,700	126½	solid	19.61	s&l-2	selec	top worm
Service 120	1,375	135	solid*	19.61	s&l-2*	selec	top worm
Signal F	1,550	144*	solid	22.50		selec	top worm
Stewart 4	1,390	128	solid	19.61		selec	int-gear
Studebaker 7	1,100	125	pneu	24.22	s&l-2	selec	bevel
Superior A	1,350	124*	solid	19.61	none	selec	int-gear
Tiffin AW	1,450	112	solid	19.61		selec	top worm
Wichita A	1,350	110*	solid	16.92	s&l-2	selec	dbl chn
Wichita K	1,650	118*	solid	19.61	s&l-2	selec	top worm
Wilcox S	1,600	128	pneu*	22.50	lighting	selec	top worm
Witt Will WD16	2,000	120	solid*	22.50		selec	top worm
Wisconsin B	1,650	136	solid	19.61		selec	top worm

ABBREVIATIONS: General, *, *with other options;* opt, *optional.* **Tires, Kind,** pneu, *pneumatic;* cush, *cushion;* p&s, *pneumatic in front, solid in rear;* p&c, *pneumatic in front, cushion in rear;* c&s, *cushion in front, solid in rear.* **Electric System** s&l, *starting and lighting;* s, l & i, *starting; lighting and ignition;* l&i, *lighting and ignition;* s&i, *starting and ignition;* -2, *two unit.* **Gearset Type,** prog, *progressive sliding gear;* selec, *selective sliding gear;* plan, *planetary;* ind-c, *constant-mesh individual clutch;* fric, *friction;* elec, *electric.* **Final Drive,** bevel, *direct bevel;* sp-bev, *spiral bevel;* doub-red, *double-reduction, bevel and spur;* int-gear, *internal-gear;* ext-gear, *external gear;* top worm, *worm gear with worm on top;* dbl chn, *double chain;* sing chn, *single chain;* -f, *to front wheels;* -4, *to all four wheels.*

TRUCKS OF 1½-TON CAPACITY

Name and Model	Chassis Price	Wheel-base, Inches	Tires	N.A.C.C. Horse-power	Electric System	Gear-set Type	Final Drive
Atterbury 6R	$1,875	140½	solid	22.50		selec.	top worm
Brockway J-2	1,825	124	solid	22.50		selec.	top worm
Chase C	1,950	138	solid	19.61		selec.	top worm
Continental (C) HL	1,750	144	solid	22.50		selec.	top worm
Corbitt D	2,150	138	solid	22.50		selec.	top worm
Dart E	1,800	130	solid	22.50		selec.	top worm
Denby G	1,575	120*	solid	19.61	s&l-2	selec.	int-gear
Diamond-T J4	2,050	154*	solid	22.50		selec.	top worm
Federal J-M	1,800	144*	solid	27.20	s&l-2	selec.	top worm
Garford 66	1,800	142*	solid	22.50	s&l	selec.	top worm
G. A. Schacht	2,650	138*	solid	29.00		selec.	top worm
G.M.C 31	1,900	144*	solid	22.50	none	selec.	top worm
Gramm-Bernstein	2,000	130*	solid	22.50	s&l-2*	ind-c.	top worm
Horner	2,250	145	solid	27.20		selec.	top worm
Hurlburt	2,250	136*	solid	22.50	lighting	selec.	top worm
Jeffery 2016	1,465	130	p&s	22.50	s&l-2	selec.	int-gear
Kelly-Springfield K-31	2,000	144*	solid*	22.50	s&l-2	selec.	dbl chn
Kelly-Springfield K-32	2,000	144*	solid*	22.50	s&l-2	selec.	top worm
Kleiber A1	2,250	140*	solid	27.20	lighting	selec.	top worm
Krebs 40	2,050	146	solid	22.50		selec.	top worm
Lange C	1,850	130*	solid	22.50	none	ind-c.	dbl chn
Larrabee	2,000	140*	solid	27.20	s,l&i-2	selec.	top worm
Lippard-Stewart F	2,300	145*	solid	27.20	s&l	selec.	top worm
Little Giant H	1,500	110	solid	19.61		selec.	dbl chn
Maccar L	2,100	150	solid	27.20	none	selec.	worm
Mack AB	2,350	162*	solid	25.60	s&l-2	selec.	top worm
Mack AB	2,350	162*	solid	25.60	s&l-2	selec.	dbl chn
Menominee H	1,775	130*	solid	22.50	none	selec.	top worm
Moreland 15-B	1,950	126*	solid	27.20	lighting	selec.	top worm
Moon B	1,600	140*	solid	22.50	none	selec.	dbl chn
New York M	2,200	144*	solid	27.20		ind-c.	top worm
Old Reliable	1,950	150*	solid	22.50	lighting	selec.	top worm
Packard 1-D	2,500	126*	solid	25.60	s&l-2	prog.	top worm
Republic 11		144	solid	22.50	s&l-2	selec.	int-gear
Sanford R	1,370	138	solid*	19.61		selec.	dbl chn
Service 130	1,950	150	solid	27.20	s&l-2*	selec.	top worm
Signal H	1,800	144*	solid	27.20		selec.	top worm
Stegeman	1,900	150	solid	25.39	s&l-2	selec.	top worm
Sullivan G	1,650	129	solid	22.50		selec.	dbl chn
Tiffin GW	1,790	135	solid	22.50		selec.	top worm
Universal G	1,950	133*	solid	22.50	lighting	selec.	top worm
White TBC	3,000	145½	pneu	22.50	s&l	selec.	db-red
Wichita L	1,800	118*	solid	19.61	s&l-2	selec.	top worm
Wilcox R	1,800	134	solid	29.00	lighting	selec.	top worm
Zeitler & Lamson	1,850	150*	solid	25.60	l&i*	ind-c.	top worm

TRUCKS OF 2-TON CAPACITY

Name and Model	Chassis Price	Wheel-base, Inches	Tires	N.A.C.C. Horse-power	Electric System	Gear-set Type	Final Drive
Acason 2		150	solid	29.00		selec.	top worm
Acme A	$2,100	148*	solid	27.20	lighting	selec.	top worm
Armleder HW-2	2,800	166*	solid	27.20	lighting	selec.	top worm
Atterbury 6C	2,375	153½	solid	27.20		selec.	top worm
Autocar 21F	1,650	97*	solid*	18.10		prog.	db-red
Available 2	2,250	156*	solid	27.20		selec.	top worm
Avery B	2,700	128	solid	36.15		selec.	dbl chn
Bessemer D	2,200*	146*	solid	27.20		selec.	top worm
Blair C	2,850	121*	solid	29.00		ind-c.	top worm
Brockway K-2	2,125	140*	solid	27.20		selec.	top worm
Burford O-3	2,250	144*	solid	22.50	lighting	selec.	int-gear
Columbia E	1,750	144*	solid	27.20	none	selec.	int-gear
Continental (C) J	2,100	146	solid	27.20		selec.	top worm
Corbitt C	2,400	148	solid	27.20		selec.	top worm
Dayton H	2,650		solid	29.00		selec.	dbl chn
DeKalb D-1½	2,100	134*	solid	27.20	none	selec.	top worm
Denby H	1,790	144*	solid	22.50	s&l-2	selec.	int-gear
Diamond-T J3	2,200	154*	solid	27.20		selec.	top worm
Dorris I-B-W	1,990	132	pneu	30.65		selec.	top worm
Federal O-P	2,100	144*	solid	27.20	s&l-2	selec.	top worm
Forschler	2,250	140*	solid*	27.20	none	selec.	top worm
Garford 70	2,300	142*	solid	29.00	s&l	selec.	top worm
G. A. Schacht	2,800	144*	solid	29.00		selec.	top worm
G.M.C 41	2,375	158*	solid	27.20	none	selec.	top worm
Gramm-Bernstein	2,300	146*	solid	22.50	s&l-2*	ind-c.	top worm

TRUCKS OF 2-TON CAPACITY (Cont'd)

Name and Model	Chassis Price	Wheel-base, Inches	Tires	N.A.C.C. Horse-power	Electric System	Gear-set Type	Final Drive
Hahn E	$2,250	144*	solid	32.40		selec.	top worm
Hall	2,000	132	solid	27.20	lighting	selec.	top worm
Harvey W-F	2,250	150	solid	29.00	s&l-2	selec.	top worm
Horner	2,650	145	solid	27.20		selec.	top worm
Hurlburt	3,300	148	solid	27.20	lighting	selec.	top worm
Independent G	1,850	144	solid	27.20		selec.	top worm
Jeffery 4016	2,850	124*	solid	29.00	s&l-2	ind-c.	int-g-4
Kisselkar	1,875	144*	solid	29.00		selec.	top worm
Kleiber A2	2,400	145*	solid	27.20	lighting	selec.	top worm
Krebs 60	2,375	162	solid	27.20		selec.	top worm
Lange B	2,450	136*	solid	27.20	none	ind-c.	dbl chn
Lippard-Stewart G	2,600	158*	solid	27.20	s&l	selec.	top worm
Little Giant 16	2,500	144	solid	27.20		selec.	top worm
Mack AB	2,700	162*	solid	25.60	s&l-2	selec.	top worm
Mack AB	2,700	162*	solid	25.60	s&l-2	selec.	dbl chn
Menominee D	2,240	144*	solid	27.20	none	selec.	top worm
Nelson & LeMoon E2	2,250	opt	solid	27.20		selec.	top worm
Netco D	2,350	144*	solid	27.20	s,l&i	selec.	top worm
Netco E	2,600	144*	solid	33.75	s,l&i	prog.	top worm
Niles E	1,875	140*	solid	27.20	opt	selec.	top worm
Old Reliable	2,450	150	solid	25.60	lighting	selec.	top worm
Packard 2-D	2,800	144*	solid	25.60	s&l-2	prog.	top worm
Palmer	1,975	144	solid	27.20	none	selec.	top worm
Peerless TC2		145	solid	32.40		selec.	top worm
Pierce-Arrow	3,000	150*	solid	25.60		selec.	top worm
Reo J	1,650	146	solid	27.20		selec.	dbl chn
Republic 12		144*	solid	27.20	s&l-2	selec.	int-gear
Sanford S	2,100	150*	solid	29.00		selec.	int-gear
Selden TC	2,000	150	solid	22.50	s&l-2	selec.	top worm
Selden JWD	2,250	150	solid	27.20	s&l	selec.	top worm
Service 140	2,250	160*	solid	27.20	s&l-2*	selec.	top worm
Signal J	2,100	150*	solid	27.20		selec.	top worm
Standard 70	2,000	140	solid	27.20		selec.	top worm
Steele C	2,250	115*	solid	27.20	lighting	ind-c.	dbl chn
Sullivan E	2,250	150	solid	27.20		selec.	top worm
Superior C	1,800	144	solid	22.50	none	selec.	int-gear
United BSW	2,250	144*	solid	27.20	s&l	selec.	top worm
U.S E	2,200	132*	solid	27.20		ind-c.	dbl chn
U.S H	2,500	144*	solid	27.20		ind-c.	top worm
Universal D	2,800	132*	solid	25.60	lighting	selec.	dbl chn
Velie 25	2,250	150*	solid	27.20	starting	selec.	top worm
Wichita B	2,100	118*	solid	19.61	s&l-2	selec.	dbl chn
Wilcox Q	2,000	150*	solid	29.00	lighting	selec.	top worm
Wilson E	2,350	144	solid	27.20		selec.	top worm
Witt-Will WD16	2,500	144	solid	27.20		selec.	top worm

TRUCKS OF 2½-TON CAPACITY

Name and Model	Chassis Price	Wheel-base, Inches	Tires	N.A.C.C. Horse-power	Electric System	Gear-set Type	Final Drive
Brinton F	$2,250	138	solid	27.20	lighting	selec.	top worm
Chase B	2,475	160	solid	27.20		selec.	top worm
Corbitt B	2,650	148	solid	27.20		selec.	top worm
Dart CC	2,470	150	solid	27.20	none	selec.	top worm
DeKalb D-2½	2,450	136*	solid	27.00	none	selec.	top worm
Denby K	2,090	144*	solid	22.50	s&l-2	selec.	int-gear
Doane	3,000-c	150	solid	29.00		selec.	dbl chn
Gersix C	2,500	150*	solid	33.75	s&l-2	ind-c.	top worm
Gramm-Bernstein	2,700	156	solid	29.00	s&l-2*	ind-c.	top worm
Kelly-Springfield K36	2,750	144*	solid*	22.50	s&l-2	selec.	top worm
Kelly-Springfield K35	2,750	144*	solid*	22.50	s&l-2	selec.	dbl chn
Kisselkar	2,250	166	solid	29.00	s&l-2*	selec.	top worm
Kleiber B	2,750	150*	solid	27.20	lighting	selec.	top worm
Lange B	2,450	136*	solid	27.20	none	ind-c.	dbl chn
Larrabee	2,300	152*	solid	27.20	s&l-2	selec.	top worm
Maccar H	2,600	162	solid	32.40	none	selec.	top worm
Moreland 15-C	2,550	144*	solid	32.40	lighting	selec.	top worm
Old Reliable	2,750		solid	29.00		selec.	dbl chn
Royal		132*	solid	25.60	starting	ind-c.	top worm
Stegeman	2,500	144*	solid	29.45	s&l-2	selec.	top worm
Sterling	2,800	156*	solid	29.00	lighting	selec.	top worm
Thomas 40	2,700	150*	solid	27.20	lighting	selec.	top worm
Tiffin MC	2,360	140	solid	27.20		selec.	dbl chn
Tiffin MW	2,500	140	solid	27.20		selec.	top worm

ABBREVIATIONS: General, *, *with other options;* opt, *optional.* **Tires, Kind,** pneu, *pneumatic;* cush, *cushion;* p&s, *pneumatic in front, solid in rear;* p&c, *pneumatic in front, cushion in rear;* c&s, *cushion in front, solid in rear.* **Electric System,** s&l, *starting and lighting;* s, l & i, *starting, lighting and ignition;* l&i, *lighting and ignition;* s&i, *starting and ignition;* -2, *two unit.* **Gearset Type,** prog, *progressive sliding gear;* selec, *selective sliding gear;* plan, *planetary;* ind-c, *constant-mesh individual clutch;* fric, *friction;* elec, *electric.* **Final Drive,** bevel, *direct bevel;* sp-bev, *spiral bevel;* doub-red, *double-reduction, bevel and spur;* int-gear, *internal-gear;* ext-gear, *external gear;* top worm, *worm gear with worm on top;* dbl chn, *double chain;* sing chn, *single chain;* -f, *to front wheels;* -4, *to all four wheels.*

TRUCKS OF 2½-TON CAPACITY (Cont'd)

Name and Model	Chassis Price	Wheel-base, Inches	Tires	N.A.C.C. Horse-power	Elec-tric System	Gear-set Type	Final Drive
Union.....B	$1,875	150	solid....	25.60	.....	selec..	int-gear
Wichita.....R	2,350	144	solid....	22.50	s&l-2....	selec..	top worm
Wisconsin.....C	2,500	156*	solid....	25.60	.....	selec..	top worm
W.S.....4	2,975	154	solid....	32.40	.....	.....	top worm-4
Zeitler & Lamson.....	2,450	160*	solid....	25.60	l&i*....	ind-c..	top worm

TRUCKS OF 3-TON CAPACITY

A & B.....3T	$4,500	144	solid....	42.76	.....	elec...	int-g-f
Avery.....A	2,500-c	140	wood....	36.15	.....	selec..	dbl chn
Avery.....B	3,200	128	solid....	36.15	.....	selec..	dbl chn
Beech Creek.....3A	3,850	132	solid....	29.00	.....	selec..	bevel-4
Blair.....D	3,250	121*	solid....	29.00	.....	ind-c..	top worm
Chase.....X	.....	160	solid....	27.20	.....	selec..	top worm
Duplex.....D	.....	130*	solid....	32.40	s,l&i....	selec..	int-gear-4
F.W.D.....B	4,000	124	solid....	36.15	s&l.....	ind-c..	bevel-4
G. A. Schacht.....	3,200	168*	solid....	29.00	.....	selec..	top worm
Horner.....	3,200	145	solid....	32.40	.....	selec..	top worm
Nelson & LeMoon.....E3	2,950	opt.....	solid....	32.40	.....	selec..	top worm
Old Reliable.....	3,250	150	solid....	29.00	lighting..	selec..	top worm
Peerless.....TC3	.....	151*	solid....	32.40	.....	selec..	dbl chn
Republic.....T	.....	165*	solid....	29.00	s&l-2....	selec..	int-gear
Riker.....	3,500	150*	solid....	29.00	s&l-2....	selec..	top worm
Schleicher.....	3,500	150*	solid....	29.00	none....	.....	dbl chn
Steele.....B	3,000	127*	solid....	40.00	lighting..	ind-c..	dbl chn
U.S.....D	2,700	144*	solid....	32.40	.....	ind-c..	dbl chn..
Universal.....A	3,400	132*	solid....	25.60	lighting..	selec..	dbl chn
White.....TAD	3,700	163	solid....	22.50	.....	selec..	dbl chn

TRUCKS OF 3½-TON CAPACITY

Acason.....	.....	168	solid....	29.00	.....	selec..	top worm
Acme.....C	.....	168*	solid....	32.40	lighting..	selec..	top worm
Armleder.....K-W	$3,500	156*	solid....	32.40	lighting..	selec..	top worm
Atterbury.....6D	3,175	167½	solid....	32.40	.....	selec..	top worm
Available.....3	3,300	168*	solid....	32.40	.....	selec..	top worm
Bessemer.....E	3,100	150*	solid....	32.40	.....	selec..	top worm
Brockway.....R	.....	164*	solid....	32.40	lighting..	selec..	top worm
Burford.....D-3	3,600	175*	solid....	32.40	lighting..	selec..	top worm
Couple Gear.....H-C	5,000	144*	solid....	53.00	light'g*..	elec...	bevel-4
Chase.....O	3,300	175	solid....	29.00	.....	selec..	top worm
Continental (C).....M	3,000	168*	solid....	32.40	.....	selec..	top worm
Corbitt.....A	3,200	168	solid....	32.40	.....	ind-c..	top worm
Dayton.....	3,400	.....	solid....	29.00	.....	selec..	worm
Dayton.....K	3,400	.....	solid....	36.15	.....	selec..	dbl chn
Diamond-T.....L	3,300	170*	solid....	32.40	.....	selec..	top worm
Federal.....L	2,800	146*	solid....	32.40	lighting..	selec..	top worm
Garford.....77-B	3,400	128*	solid....	29.00	s&l.....	selec..	top worm
G.M.C.....71	3,300	163*	solid....	32.40	none....	selec..	top worm
Gramm-Bernstein.....	3,400	158*	solid....	29.00	s&l-2*...	ind-c..	top worm
Hall.....	2,800	144	solid....	32.40	lighting..	selec..	top worm*
Harrison.....C	.....	.....	solid....	32.40	.....	selec..	dbl chn
Harrison.....F	.....	.....	solid....	32.40	.....	selec..	dbl chn
Harvey.....W-H	2,950	160*	solid....	29.00	s&l-2....	selec..	top worm
Hurlburt.....	3,500	146*	solid....	29.00	lighting..	selec..	top worm
Kelly-Springfield....K-40	3,400	150*	solid*...	32.40	s&l-2....	selec..	dbl chn
King.....	2,600	120	solid....	32.40	.....	ind-c..	dbl chn
Kleiber.....C	3,500	160*	solid....	32.40	lighting..	selec..	top worm
Knickerbocker.....A	3,500	128	solid....	32.40	lighting..	selec..	dbl chn
Krebs.....90	3,250	180	solid....	32.40	.....	selec..	top worm
Maccar.....M	3,250	174	solid....	32.40	none....	selec..	top worm
Mack.....AC	3,400	156*	solid....	40.00	s&l-2....	selec..	dbl chn
Menominee.....G	2,775	160*	solid....	32.40	none....	.....	top worm
Packard.....3-D	3,400	156*	solid....	32.40	s&l-2....	prog..	top worm
Royal.....	.....	158*	solid....	29.00	starting..	ind-c..	top worm

TRUCKS OF 3½-TON CAPACITY (Cont'd)

Name and Model	Chassis Price	Wheel-base, Inches	Tires	N.A.C.C. Horse-power	Elec-tric System	Gear-set Type	Final Drive
Selden.....N	$2,950	164	solid....	32.40	s&l-2....	selec..	top worm
Service.....170	3,000	170*	solid....	29.00	s&l-2*...	selec..	top worm
Service.....175	3,250	170*	solid....	32.40	s&l-2*...	selec..	top worm
Signal.....M	3,000	168	solid....	32.40	.....	selec..	top worm
Standard.....60	2,850	144*	solid....	32.40	.....	selec..	top worm
Stegeman.....	3,000	156	solid....	33.75	s&l-2....	selec..	top worm
Sterling.....	3,400	158*	solid....	29.00	lighting..	selec..	top worm
United.....CSW	2,900	144*	solid....	32.40	s&l.....	selec..	top worm
U.S.....J	3,150	156*	solid....	32.40	.....	ind-c..	top worm
Velie.....26	3,350	172*	solid....	32.40	none....	selec..	top worm
Walter.....C	4,200	132*	solid....	30.65	.....	selec..	ext-g-4
Wichita.....O	3,250	165*	solid....	32.40	s&l-2....	selec..	top worm
Wilcox.....P	2,900	154*	solid....	29.00	lighting..	selec..	top worm
Zeitler & Lamson.....	3,150	170*	solid....	36.15	l&i.....	ind-c..	top worm

TRUCKS OF 4-TON CAPACITY

Blair.....E	$3,750	144*	solid....	32.40	.....	ind-c..	top worm
Kelly-Springfield....K-45	3,600	150*	solid*...	32.40	s&l-2....	selec..	dbl chn
Kisselkar.....	2,850	168*	solid....	29.00	s&l-2*...	selec..	top worm
Moreland.....15-G	3,400	162*	solid....	36.15	lighting..	selec..	top worm
Old Reliable.....	3,750	.....	solid....	36.15	lighting..	selec..	top worm
Old Reliable.....	3,750	.....	solid....	36.15	lighting..	selec..	dbl chn
Packard.....4-D	3,800	156*	solid....	32.40	s&l-2....	prog..	top worm
Peerless.....TC4	.....	151*	solid....	32.40	.....	selec..	dbl chn
Riker.....	3,650	150*	solid....	29.00	s&l-2....	selec..	top worm
Standard.....40	3,025	144*	solid....	32.40	.....	selec..	dbl chn
Steele.....BA	3,500	127*	solid....	40.00	lighting..	ind-c..	dbl chn
United.....DSW	3,300	144*	solid....	36.15	s&l.....	selec..	top worm

TRUCKS OF 5-TON CAPACITY

A & B.....5T	$4,750	144	solid....	42.76	.....	elec...	int-g-f....
Available.....5	4,400	168*	solid....	32.40	.....	selec..	top worm
Avery.....B	4,500	128	solid....	44.20	.....	selec..	dbl chn
Bessemer.....H	3,600	150	solid....	32.40	.....	selec..	top worm
Blair.....F	4,250	144*	solid....	32.40	.....	ind-c..	top worm
Couple Gear.....AC	5,350	144*	solid....	53.00	lighti'g*.	elec...	bevel-4
Dayton.....M	4,500	.....	solid....	44.20	.....	selec..	dbl chn
Diamond-T.....R	4,200	170*	solid....	32.40	.....	selec..	top worm
Federal.....W	.....	156*	solid....	29.00	s,l&i*...	selec..	top worm
Garford.....68	4,300	128*	solid....	36.15	none....	selec..	dbl chn
G.V. Mercedes.....FV	.....	192½	solid....	29.00	.....	selec..	int-gear
G.M.C.....101	3,850	163*	solid....	32.40	none....	selec..	top worm
Gramm-Bernstein.....	4,300	168*	solid....	32.40	s&l-2*...	ind-c..	top worm
Hall.....	3,400	144	solid....	32.40	lighting..	selec..	dbl chn
Harvey.....W-K	3,600	160*	solid....	32.40	s&l-2....	selec..	top worm
Horner.....	4,200	156	solid....	44.20	.....	selec..	top worm
Hurlburt.....	4,250	156*	solid....	33.75	lighting..	selec..	top worm
Kelly-Springfield....K-50	4,250	150*	solid*...	32.40	s&l-2....	selec..	dbl chn
Kisselkar.....	3,350	180	solid....	29.00	s&l-2*...	selec..	top worm
Kleiber.....D	4,500	170*	solid....	44.20	lighting..	selec..	top worm
Knickerbocker.....C	4,500	148*	solid....	32.40	lighting..	selec..	dbl chn
Moreland.....16-J	3,800	180*	solid....	36.15	lighting..	selec..	worm
Old Reliable.....	4,500	150*	solid....	36.15	lighting..	selec..	dbl chn
Peerless.....TC5	.....	151*	solid....	32.40	.....	selec..	dbl chn
Pierce-Arrow.....	4,500	168*	solid....	38.25	.....	selec..	top worm
Royal.....	.....	168*	solid....	36.15	starting..	ind-c..	top worm
Saurer.....L	4,800	153½	solid....	34.28	none....	selec..	dbl chn
Schleicher.....	4,500	150*	solid....	40.00	none....	selec..	dbl chn
Service.....200	4,000	170*	solid....	32.40	s&l-2*...	selec..	top worm
Signal.....R	4,000	180	solid....	32.40	.....	selec..	top worm
Standard.....50	3,400	144*	solid....	29.00	.....	selec..	topworm
Steele.....A	4,000	127*	solid....	40.00	lighting..	ind-c..	dbl chn
Stegeman.....	4,000	170	solid....	33.75	s&l-2....	selec..	top worm
Sterling.....	4,500	168	solid....	36.15	lighting..	selec..	top worm

ABBREVIATIONS: General, *, *with other options;* opt, *optional.* **Tires, Kind,** pneu, *pneumatic;* cush, *cushion;* p&s, *pneumatic in front, solid in rear;* p&c, *pneumatic in front, cushion in rear;* c&s, *cushion in front, solid in rear.* **Electric System,** s&l, *starting and lighting;* s, l & i, *starting, lighting and ignition;* l&i, *lighting and ignition;* s&i, *starting and ignition;* -2, *two unit.* **Gear-set Type,** prog, *progressive sliding gear;* selec, *selective sliding gear;* plan, *planetary;* ind-c, *constant-mesh individual clutch;* fric, *friction;* elec, *electric.* **Final Drive,** bevel, *direct bevel;* sp-bev, *spiral bevel;* doub-red, *double-reduction, bevel and spur;* int-gear, *internal-gear;* ext-gear, *external gear;* top worm, *worm gear with worm on top;* dbl chn, *double chain;* sing chn, *single chain;* -f, *to front wheels;* -4, *to all four wheels.*

TRUCKS OF 5-TON CAPACITY (Cont'd)

Name and Model	Chassis Price	Wheel-base, Inches	Tires	N.A.C.C. Horse-power	Electric System	Gear-set Type	Final Drive
Tiffin.....RW	$4,250	168	solid....	33.75	s&l-2....	selec..	top worm
United.....ESW	3,900	144*	solid....	41.62	s&l-2*...	selec..	top worm
U.S.....K	4,000	168*	solid....	36.15	.....	ind-c..	top worm
White.....TCD	4,500	169	solid....	29.00	.....	selec..	dbl chn
Wichita.....Q	3,850	165*	solid....	32.40	s&l-2....	selec..	top worm
Zeitler & Lamson.....	4,150	180*	solid....	41.62	l&i*.....	ind-c..	top worm

TRUCKS OF 5½-TON CAPACITY

Maccar.....U	.....	186	solid....	32.40	.....	selec..	top worm
Mack.....AC	$4,000	156*	solid....	40.00	s&l-2....	selec..	dbl chn

TRUCKS OF 6-TON CAPACITY

Doane.....	$4,500-c	178	solid....	36.15	.....	selec..	dbl chn
Garford.....69	4,500	128*	solid....	41.61	none...	selec..	dbl chn
Gramm-Bernstein.....	4,500	168*	solid....	32.40	s&l-2*...	ind-c..	top worm
G.V.-Mercedes.....S.V.	.....	192½	solid....	29.00	.....	selec..	int-gear
Kelly-Springfield....K-60	4,500	150*	solid*...	32.40	s&l-2....	selec..	dbl chn
Peerless.....TC6	.....	151*	solid....	32.40	.....	selec..	dbl chn
Royal.....	.....	158	solid....	42.20*	.....	ind-c..	top worm*
Tiffin.....SW	4,550	168	solid....	33.75	s&l-2....	selec..	top worm

TRUCKS OF 6½-TON CAPACITY

Name and Model	Chassis Price	Wheel-base, Inches	Tires	N.A.C.C. Horse-power	Electric System	Gear-set Type	Final Drive
Saurer.....M	$5,800	156½	solid....	34.28	none....	selec..	dbl chn

TRUCKS OF 7-TON CAPACITY AND OVER

Dayton.....E	$4,950	.....	solid....	44.20	.....	selec..	dbl chn
Hurlburt.....	5,000	156*	solid....	33.75	lighting..	selec..	top worm
Mack.....AC	4,500	156*	solid....	40.00	s&l-2....	selec..	dbl chn
Old Reliable.....	5,000	150	solid....	41.62	lighting..	selec..	dbl chn
Royal.....	.....	158*	solid....	44.20	.....	ind-c..	dbl chn
Sterling.....	4,750	168	solid....	36.15	lighting..	selec..	dbl chn
Walter.....B	4,750	162*	solid....	30.65	.....	selec..	ext-g

TRACTORS

Knox.....35	$4,500	108½	solid....	40.00	s&l-2....	selec..	dbl chn
Knox.....36	5,000	108½	solid....	40.00	s&l-2....	selec..	dbl chn
Mack.....AC	3,400	119	solid....	40.00	s&l-2....	selec..	dbl chn
Mack.....AC	4,000	119	solid....	40.00	s&l-2....	selec..	dbl chn
Mack.....AC	4,500	119	solid....	40.00	s&l-2....	selec..	dbl chn
Mercury-Bulley.....A	3,400	71	solid....	29.00	lighting..	ind-c..	dbl chn
Transport.....T	2,500	80	solid....	19.61	.....	selec..	top worm
Watson.....	3,600	80	solid....	32.40	.....	selec..	top worm

ABBREVIATIONS: General, *, *with other options;* opt, *optional.* **Tires, Kind,** pneu, *pneumatic;* cush, *cushion;* p&s, *pneumatic in front, solid in rear;* p&c, *pneumatic in front, cushion in rear;* c&s, *cushion in front, solid in rear.* **Electric System,** s&l, *starting and lighting;* s, l & i, *starting lighting and ignition;* l&i, *lighting and ignition;* s&i, *starting and ignition;* -2, *two unit.* **Gearset Type,** prog, *progressive sliding gear;* selec, *selective sliding gear;* plan, *planetary;* ind-c, *constant-mesh individual clutch;* fric, *friction;* elec, *electric.* **Final Drive** bevel, *direct bevel;* sp-bev, *spiral bevel;* doub-red, *double-reduction, bevel and spur;* int-gear, *internal-gear;* ext-gear, *external gear;* top worm, *worm gear with worm on top;* dbl chn, *double chain;* sing chn, *single chain;* -f, *to front wheels;* 4, *to all four wheels.*

Military Truck a Complicated Problem

(*Continued from page* 751)

We have already gained a great deal of knowledge regarding the good and bad points in design from Europe and from the Mexican border. When more news comes from France and England we shall know still more than we do at present, but even then there are conditions in America which differ from any to be found in Europe, so whatever volume of information may come from across the Atlantic, America will still have to depend mainly upon her own engineers.

Years ago the Glidden Tours did much to take the conceit out of the passenger car engineering profession, as year after year they brought out weak spots in design. Until the last 2 years the motor truck had had no corresponding test, which means that truck engineers have never had any real large collection of data relating to tests to destruction. No one here can make much progress by relying entirely upon his own experience; or, putting it another way, the larger the amount of the experience upon which any engineer can draw the faster is his progress likely to be.

The military authorities have nearly 3000 trucks in use along the border and know the good, bad and indifferent features of each design and they are making analyses which will be a wonderful help in specifying the army requirements in the future. The engineers of the industry have access to much of this information and when told of a particular kind of failure they can probably get to the original cause of it quicker than any one else. It would be a wonderfully instructive thing to take six of the leading truck engineers and have them individually, and without co-operation, each design his ideal military truck. When the six machines were made and put in service it would certainly be found that each had its points of fitness and each had its weaknesses, while it is also certain that amalgamation of the virtues of the six into a seventh new design would produce a truck as near the ideal as anything the engineering profession can produce at present.

The Society of Automobile Engineers is trying to obtain the broad specifications for a hypothetical seventh truck in a quicker and perhaps an even more thorough manner.

In the truck industry there are many men whose vehicles have gone to the border and these men each know just what is wrong with his own particular designs; each of them has already formed an idea as to what he would design were he to build the machine solely for army work.

The S. A. E. believes it possible to amalgamate the knowledge of all these men, obtaining therefrom one ideal specification for a military truck which will stand better chance of being really correct than would the ideal of any one engineer alone. The method which has been adopted is to draft the specification which was published in THE AUTOMOBILE for Oct. 9, and discussing this original draft, in committee and by correspondence, detail by detail, it will soon be seen upon what points the engineers, as a whole, are agreed.

When a man is doubtful about his politics he talks to others, discovers their ideas and eventually makes up his mind; similarly the work the S. A. E. has set out to do is to make up the mind of the truck engineers as a body by facilitating discussion between the individual members thereof. Unofficially, the S. A. E. is going to obtain a great deal of assistance in this work from some of those who have had charge of the trucks on the border and who have, therefore, first-hand knowledge.

Technical Specifications of Gaso

Details of 386 Gasoline and Gasoline-Electric Motor Truck Chassis Engine, Transmission, Control and Equipment

Name and Model	Capacity in Pounds	Price of Chassis	Wheelbase in Inches	FRAME		TIRES			Wheels	MOTOR								
				Material	Construction	Kind	SIZES IN INCHES Front	SIZES IN INCHES Rear		No. of Crankshaft Bearings	Bore and Stroke	N.A.C.C. Hp.	Cylinders Cast	Valves Placed	COOLING Water Circulation	COOLING Radiator Core and Case	IGNITION Type	IGNITION Make	IGNITION Spark Advance
A & B.....3 T	6,000	$4,500	144	rolled-c..	semi-flx..	solid....	48x3½d	48x3½d	wood-ov.	3	4-5½x4½	42.76	pairs....	right...	gear...	fin-sheet...	dual..	Bosch....	hand...
A & B.....5 T	10,000	4,750	144	rolled-c..	semi-flx..	solid....	48x3½d	48x5d	wood-ov.	3	4-5½x4½	42.76	pairs....	right...	gear...	fin-sheet...	dual..	Bosch....	hand...
Acason.....2	4,000	.....	150	pr-steel..	semi-flx..	solid....	34x4	36x3½d	wood-ov	3	4-4½x5½	29.00	pairs....	left....	cent...	fin-cast...	sing..	Eisemann..	hand...
Acason.....	7,000	.....	168	pr-steel..	semi-flx..	solid....	36x5	38x5d	wood-ov.	3	4-4½x5½	29.00	pairs....	left....	cent...	fin-cast...	sing..	Eisemann..	hand...
Acme.....B	2,000	1,500	128	pr-steel..	semi-flx..	pneu....	34x3	34x4	wood-sq.	3	4-3½x5	19.61	block...	left....	thermo.	fin-sheet...	sing..	Eisemann..	hand...
Acme.....A	4,000	2,100	148*	pr-steel..	semi-flx..	solid....	36x4	36x6	wood-sq.	3	4-4½x5½	27.20	block...	left....	cent...	fin-sheet...	sing..	Eisemann..	fixed...
Acme.....C	7,000	.....	168*	rolled-c..	semi-flx..	solid....	36x5	40x5d	wood-sq.	3	4-4½x5½	32.40	pairs....	left....	cent...	fin-cast...	sing..	Eisemann..	fixed...
Armleder.....HW2	4,000	2,800	166*	pr-steel..	semi-flx..	solid....	36x4	36x7*	wood-sq.	3	4-4½x5½	27.20	block...	left....	cent...	cell-sheet..	sing..	Bosch....	hand...
Armleder.....KW	7,000	3,500	156*	rolled-I..	semi-flx..	solid....	36x5	36x5d	wood-sq.	3	4-4½x5½	32.40	pairs....	left....	cent...	fin-cast...	sing..	Bosch....	hand...
Atlas.....17	1,000	690	106	pr-steel..	.....	pneu....	30x3½	30x3½	wood-ov.	2	4-3¼x5	16.92	block...	right...	thermo.	fin-sheet..	sing..	Dixie....	hand...
Atterbury.....6B	2,000	1,775	140½	pr-steel..	flexible..	solid....	36x3½	36x5	wood-sq.	3	4-3½x5½	22.50	block...	left....	cent...	fin-cast...	sing..	Bosch....	fixed...
Atterbury.....6R	3,000	1,875	140½	pr-steel..	flexible..	solid....	36x3½	36x5	wood-sq.	3	4-3½x5½	22.50	block...	left....	cent...	fin-cast...	sing..	Bosch....	fixed...
Atterbury.....6C	4,000	2,375	153½	pr-steel..	flexible..	solid....	36x4	36x4d	wood-sq.	3	4-4½x5½	27.20	block...	left....	cent...	fin-cast...	sing..	Bosch....	fixed...
Atterbury.....6D	7,000	3,175	167½	pr-steel..	flexible..	solid....	36x5	40x5d..	wood-sq.	3	4-4½x5½	32.40	pairs....	left....	cent...	fin-cast...	dual..	Bosch....	hand...
Autocar.....21F	4,000	1,650	97	rolled-c.	.....	solid*...	34x4*	34x5*	wood-ov.	2	2-4½x4½	18.10	sing.....	top....	cent...	cell-sheet..	sing..	Bosch....	fixed...
Available.....1	2,000	1,700	132*	rolled-c..	semi-flx..	solid....	36x3½	36x4	wood-ov.	3	4-3½x5	22.50	block...	right...	thermo.	cell-sheet..	sing..	Bosch....	fixed...
Available.....2	4,000	2,250	156*	rolled-c..	semi-flx..	solid....	36x4	36x7	wood-ov.	3	4-4½x5½	27.20	block...	left....	cent...	cell-sheet..	sing..	Bosch....	fixed...
Available.....3	7,000	3,300	168*	rolled-c..	semi-flx..	solid....	36x5	40x5d	wood-ov.	3	4-4½x5½	32.40	pairs....	left....	cent...	cell-sheet..	sing..	Bosch....	fixed...
Available.....5	10,000	4,400	168*	rolled-c..	semi-flx..	solid....	36x6	40x6d	wood-ov.	3	4-4½x5½	32.40	pairs....	right....	cent...	cell-sheet..	sing..	Bosch....	fixed...
Avery.....C	2,000	1,690	128	.....	.....	solid....	34x3½	34x5	.....	.....	4-4½x5½	27.20	block...	left....	cent...	fin-sheet..	dual..	Heinse....	hand...
Avery.....B	4,000	2,700	128	.....	.....	solid....	36x4	36x3½d	.....	.....	4-4½x5	36.15	sing.....	left....	cent...	fin-sheet..	dual..	Eisemann..	auto...
Avery.....B	6,000	3,200	128	.....	.....	solid....	38x5	38x4d	.....	.....	4-4½x5	36.15	sing.....	left....	cent...	cell-sheet..	dual..	Eisemann..	auto...
Avery.....A	6,000	2,500-c	140	.....	.....	wood....	38x5	38x4d	.....	.....	4-4½x5	36.15	sing.....	left....	cent...	fin-sheet..	dual..	Eisemann..	auto...
Avery.....B	10,000	4,500	128	.....	.....	solid....	38x6	•38x5d	.....	.....	4-5½x5½	44.20	pairs....	opp....	cent...	cell-sheet..	dual..	Eisemann..	auto...
Beech Creek.....3A	6,000	3,850	132	rolled-c..	flexible..	solid....	36x6	36x6	wood-sq.	3	4-4½x5½	29.00	pairs....	left....	cent...	cell-sheet..	sing..	Eisemann.	hand...
Bessemer.....G	2,000	975	124	pr-steel..	semi-flx..	solid....	35x3	35x3½	wood-sq.	3	4-3½x5	19.61	block...	right...	thermo	cell-sheet..	sing..	Bosch....	hand...
Bessemer.....D	4,000	2,200*	146*	pr-steel..	semi-flx..	solid....	37x4	37x4d	wood-sq.	3	4-4½x5½	27.20	block...	left....	cent...	cell-cast...	sing..	Bosch....	hand...
Bessemer.....E	7,000	3,100	150*	pr-steel..	semi-flx..	solid....	37x5	37x5d	wood-sq.	3	4-4½x5½	32.40	pairs....	left....	cent...	cell-cast...	sing..	Bosch....	hand...
Bessemer.....H	10,000	3,600	150	pr-steel..	semi-flx..	solid....	37x6	37x6d	wood-sq.	3	4-4½x5½	32.40	pairs....	left....	cent...	cell-cast...	sing..	Bosch....	hand...
Blair.....C	4,000	2,850	121*	pr-steel..	flexible..	solid....	34x4	34x3½d	wood-sq.	3	4-4½x5½	29.00	pairs....	left....	cent...	z-z-t-sheet	dual..	Bosch....	fixed...
Blair.....D	6,000	3,250	121*	pr-steel..	flexible..	solid....	36x4	36x4d	wood-sq.	3	4-4½x5½	29.00	pairs....	left....	cent...	z-z-t-sheet	dual..	Bosch....	fixed...
Blair.....E	8,000	3,750	144*	pr-steel..	flexible..	solid....	36x5	36x5d	wood-sq.	3	4-4½x6½	32.40	pairs....	left....	cent...	z-z-t-sheet	dual..	Bosch....	auto...
Blair.....F	10,000	4,250	144*	pr-steel..	flexible..	solid....	36x6	36x6d	wood-sq.	3	4-4½x6½	32.40	pairs....	left....	cent...	z-z-t-sheet	dual..	Bosch....	auto...
Brinton.....H	1,500	950	115	.....	semi-flx..	pneu*	33x4	33x4*	wood-ov.	2	4-3½x5	16.92	block...	left....	gear...	cell-sheet..	sing..	.....	fixed...
Brinton.....F	5,000	2,250	138	.....	semi-flx..	solid....	36x4	36x6	wood-ov.	3	4-4½x5	27.20	block...	left....	gear...	cell-sheet..	sing..	.....	fixed...
Briscoe.....4-24	1,000	625	104	pr-steel..	rigid....	pneu....	30x3½	30x3½	wood-ov.	2	4-3½x5½	16.92	block...	right...	thermo.	z-z-t-sheet	sing..	Splitdorf..	hand...
Brockway.....O	2,000	1,450	124*	pr-steel..	flexible..	solid....	34x3½	34x4	wood-sq.	3	4-3½x5	19.61	block...	right...	thermo.	fin-cast...	sing..	Bosch....	fixed...
Brockway.....J-2	3,000	1,825	124*	pr-steel..	flexible..	solid....	36x3½	36x5	wood-sq.	3	4-3½x5	22.50	block...	right...	thermo.	fin-cast...	sing..	Bosch....	fixed...
Brockway.....K-2	4,000	2,125	140*	pr-steel..	flexible..	solid....	36x4	36x6*	wood-sq.	3	4-4½x5½	27.20	block...	left....	cent...	fin-cast...	sing..	Bosch....	fixed...
Brockway.....R	7,000	.....	164*	pr-steel..	semi-flx..	solid....	36x5	36x5d	wood-sq.	3	4-4½x5½	32.40	pairs....	left....	cent...	fin-cast...	sing..	Bosch....	hand...
Burford.....O-3	4,000	2,250	144*	pr-steel..	rigid....	solid....	36x3½	36x3½d	wood-sq.	3	4-3½x5½	22.50	block...	right...	cent...	fin-cast...	sing..	Eisemann.	fixed...
Burford.....D-3	7,000	3,600	175*	pr-steel..	rigid....	solid....	38x5	38x5d	wood-sq.	3	4-4½x6½	32.40	block...	left....	cent...	fin-cast...	sing..	Eisemann.	fixed...
Couple Gear.....HC	7,000	5,000	144*	rolled-c..	semi-flx..	solid....	36x4d	36x4d	pr-steel-d	5	4-5½x6	53.00	sing.....	opp....	gear...	cell-sheet..	dual..	Eisemann.	2-pt.-fix.
Couple Gear.....AC	10,000	5,350	144*	rolled-c..	semi-flx..	solid....	36x5d	36x5d	pr-steel-d	5	4-5½x6	53.00	sing.....	opp....	gear...	cell-sheet..	dual..	Eisemann.	2-pt.-fix.
Chase.....A	2,000	1,650	.....	pr-steel..	.....	solid....	36x3½	36x5	wood-ov.	3	4-3½x5½	19.61	block...	.....	cent...	fin-sheet..	sing..	Bosch....	fixed...
Chase.....C	3,000	1,950	138	pr-steel..	.....	solid....	36x3½	36x3½d	wood-ov.	3	4-3½x5½	19 61	block...	.....	cent...	fin-cast...	sing..	Bosch....	fixed...
Chase.....B	5,000	2,475	160	pr-steel..	.....	solid....	36x4	36x4d	wood....	3	4-4½x5½	27.20	block...	.....	cent...	fin-cast...	sing..	Bosch....	fixed...
Chase.....X	6,000	.....	160	pr-steel..	.....	solid....	36x4	36x5d	wood....	3	4-4½x5½	27.20	block...	.....	cent...	fin-cast...	sing..	Bosch....	fixed...
Chase.....O	7,000	3,300	175	pr-steel..	.....	solid....	36x5	36x5d	wood-ov.	3	4-4½x6	29.00	block...	.....	cent...	fin-cast...	sing..	Bosch....	fixed...
Collier.....M	1,500	800	118	rolled-c.	semi-flx..	pneu....	33x4	33x4	wood-ov.	3	4-3½x5	16.92	block...	right...	thermo.	z-z-t-sheet	sing..	Conn.....	hand...
Columbia.....E	4,000	1,750	144*	pr-steel.	.....	solid....	36x4	36x6	wood-sq.	3	4-4½x5½	27.20	block...	right...	cent...	z-z-t-cast..	sing..	Eisemann.	hand...
Commerce.....N	1,500	975	120	pr-steel..	flexible..	pneu....	34x4	34x4	wood-sq.	3	4-3½x5	19.61	block...	left....	thermo.	fin-cast...	sing..	Eisemann.	fixed...
Commerce.....E	2,000	1,175	126	pr-steel..	flexible..	solid....	34x3	34x4	wood-sq.	3	4-3½x5	19.61	block...	left....	thermo.	fin-cast...	sing..	Remy.....	hand...
Continental (C).....FL	2,000	1,550	144	.....	.....	solid....	34x3	36x4	.....	3	4-3½x5½	22.50	pairs....	left....	cent...	fin-cast...	sing..	Bosch*...	fixed...
Continental (C).....HL	3,000	1,750	144	.....	.....	solid....	34x3½	36x5	.....	3	4-3½x5½	22.50	pairs....	left....	cent...	fin-cast...	sing..	Bosch*...	fixed...
Continental (C).....J	4,000	2,100	146	.....	.....	solid....	36x4	36x4d	.....	3	4-4½x5½	27.20	pairs....	left....	cent...	cell-cast...	sing..	Bosch*...	fixed...
Continental (C).....M	7,000	3,000	168*	.....	.....	solid....	36x5	36x5d	.....	3	4-4½x5½	32.40	pairs....	left....	cent...	cell-cast...	sing..	Bosch*...	fixed...
Corbitt.....D	3,000	2,150	138	pr-steel..	rigid....	solid....	36x3½	36x5	wood-sq.	3	4-3½x5½	22.50	block...	right...	cent...	fin-cast...	sing..	Eisemann..	hand...
Corbitt.....C	4,000	2,400	148	pr-steel..	rigid....	solid....	36x3½	36x3½d	wood-sq.	3	4-4 x5½	27.20	block...	right...	cent...	fin-cast...	sing..	Eisemann..	hand...
Corbitt.....B	5,000	2,650	148	pr-steel..	rigid....	solid....	36x4	36x4d	wood-sq.	3	4-4½x5½	27.20	block...	right...	cent...	fin-cast...	sing..	Eisemann..	hand...

ABBREVIATIONS: General, *, *with other options;* opt, *optional;* **Price,** -c, *complete with body.* **Frame, Material,** pr-steel, *pressed steel;* rolled-c, *rolled steel, channel section;* rolled-I, *rolled steel, I section;* **Frame Construction,** semi-flx, *semi flexible.* **Tires, kind,** Pneu, *pneumatic;* cush, *cushion,* p & s, *pneumatic front, solid, rear;* s & st, *solid rubber front, steel in rear.* **Tire Sizes,** -d, *dual.* **Wheels,** pr-steel, *pressed steel;* -ov, *oval spokes;* -sq, *square spokes;* -d, *disk or web type;* -hol, *hollow spokes;* -cr, *cruciform spokes;* -x, *cross-shaped solid spokes.* **Cylinders cast,** sing, *singly or individually.* **Location of valves,** opp, *opposite, T-head motor;* r & h, *one valve at right, the other in head, L-head motor;* l & h, *one valve at left the other in head, L-head motor.* **Water circulation,** cent, *centrifugal pump;* thermo-, *thermo-syphon or natural circulation;* gear, *gear pump.* **Radiator Type,** fin, *individually finned tubes;* sq-t, *square-tubular, resembling cellular, sometimes known as flat-tubular;* z-z-t, *zig-zag tubular, resembling cellular,* cell, *cellular or honeycomb type;* tube, *plain tubes without fins;* ring, *tubes arranged in ring about blower fan.* **Radiator Case,** -sheet, *sheet metal;* -cast, *cast metal, built up.* **Ignition Type,** sing, *single;* doub, *double,* dual-d, *dual-double.* **Make of Magneto** (or other sparking device), Conn., *Connecticut;* storage, *storage battery;* Westghs, *Westinghouse;* G & D, *Gray & Davis;* At Kent, *Atwater Kent.* **Spark Advance,** auto, *automatic;* 2-pt-fix, *two-point fixed, battery circuit in retard, magneto in advance.* **Electric System Type,** s, l & i, *starting, lighting and ignition, combination unit;* s & l, *starting and lighting, combination unit;* s & l-2, *starting and lighting, two-unit;* l & i, *lighting and ignition, combination unit.* **Electric System, Make,** Splitdf, *Splitdorf;* Al-Chal,—**(Abbreviations Continued on Opposite Page.)**

line Commercial Vehicles for 1917

Produced by 137 American Manufacturers, with Full Particulars of —Two Steam Models of One Maker Included

MOTOR										TRANSMISSION							BRAKES		CONTROL		
ELECTRIC SYSTEM			GOVERNOR			SPEED		FUEL SYSTEM			GEARSET			Total Gear Reduction in High	Final Drive	Propulsion Taken By	Torque Taken By					Name and Model
Type	Make	Extra Cost	Type	Drive	Make	Motor in r. p. m.	Truck in m. p. h.	Carbureter Make	Fuel Feed	Tank Location	Clutch Type	Type	Location	Sp'ds					Hand	Foot	Steer	Levers	
.....	.....	.....	.....	.....	.....	.....	.....	Scheb..	grav.	seat..	none..	elec..	amid...	2	28.00–1	int-g-f..	rad-rd..	rad-rd..	ex-r-w..	ex-f-w..	right.	right.	A & B..... 3T
.....	.....	.....	.....	.....	.....	.....	.....	Scheb..	grav.	seat..	none..	elec..	amid...	2	28.00–1	int-g-f..	rad-rd..	rad-rd..	ex-r-w..	ex-f-w..	right.	right.	A & B$_5$..... 5T
.....	.....	.....	cent..	motor.	Wauk'a..	1,100	17½	Scheb..	vac..	.....	dry-d..	selec.	unit-m.	4	.....	worm..	springs.	springs.	int-r-w.	int-r-w.	right.	cent..	Acason..... 2
.....	.....	.....	cent..	motor.	Wauk'a..	1,100	13½	Scheb..	vac..	.....	dry-d..	selec.	unit-m.	4	.....	worm..	springs.	springs.	int-r-w.	int-r-w.	right.	cent.	Acason.....
.....	.....	.....	cent..	motor.	Pierce...	1,700	22	Ray...	vac..	.....	dry-d..	selec.	unit-m.	3	7.75–1	worm..	springs.	springs.	int.....	int.....	left..	cent..	Acme..... B
lighting.	.....	opt.	cent..	motor.	Pierce...	1,300	17	Ray...	vac..	.....	dry-d..	selec.	unit-m.	3	8.50–1	worm..	springs.	springs.	int.....	int.....	.....	cent..	Acme..... A
lighting.	.....	opt.	cent..	motor.	Pierce...	1,200	14	Ray...	vac..	.....	dry-p..	selec.	amid...	3	10.25–1	worm..	rad-rd..	springs.	int-r-w.	int-r-w.	left..	cent..	Acme..... C
lighting.	.....	60.00	cent..	drive-s.	Pierce*..	1,200	16	Scheb..	grav.	seat..	wet-d.	selec.	unit-m.	3	8.50–1	worm..	rad-rd..	springs.	int-r-w.	int-r-w.	left..	cent..	Armleder..... HW2
lighting.	.....	60.00	cent..	motor*.	Pierce...	1,100	14	Scheb..	grav.	seat..	wet-d.	selec.	unit-m.	3	8.75–1	worm..	rad-rd..	springs.	int-r-w.	ext-sht.	left..	cent..	Armleder..... KW
.....	.....	.....	.....	.....	.....	.....	.....	Carter..	grav.	seat..	wet-d.	selec.	unit-m.	3	4.75–1	sp-bev..	springs.	springs.	ext-r-w.	int-r-w.	left..	cent..	Atlas..... 17
.....	.....	.....	cent..	motor.	Pierce...	1,200	16½	Zenith..	grav.	seat..	dry-d..	selec.	unit-m.	4	7.75–1	worm..	springs.	springs.	int-r-w.	int-r-w.	right.	right.	Atterbury..... 6B
.....	.....	.....	cent..	motor.	Pierce...	1,200	15	Zenith..	grav.	seat..	dry-d..	selec.	unit-m.	4	7.75–1	worm..	springs.	springs.	int-r-w.	int-r-w.	right.	right.	Atterbury..... 6R
.....	.....	.....	cent..	motor.	Pierce...	1,200	15	Zenith..	grav.	seat..	dry-d..	selec.	unit-m.	4	8.50–1	worm..	springs.	springs.	int-r-w.	int-r-w.	right.	right.	Atterbury..... 6C
.....	.....	.....	cent..	motor.	Pierce...	1,125	13	Zenith..	grav.	seat..	dry-d..	selec.	unit-m.	4	10.33–1	worm..	springs.	springs.	int-r-w.	int-r-w.	right.	right.	Atterbury..... 6D
.....	.....	.....	.....	.....	.....	.....	.....	Stmbg..	.....	seat..	dry-p..	prog.	amid...	3	7.14–1	db-red..	springs.	springs.	int-r-w.	ext-r-w.	right.	right.	Autocar..... 21F
.....	.....	.....	none	.....	.....	.....	.....	Stmbg.	grav.	seat..	dry-d..	selec.	unit-m.	3	7.00–1	worm..	springs.	springs.	int.....	int.....	left..	cent..	Available..... 1
.....	.....	.....	none	.....	.....	.....	.....	Stmbg	grav.	seat..	dry-d..	selec.	unit-m.	3	7.75–1	worm..	springs.	springs.	int.....	int.....	left..	cent..	Available..... 2
.....	.....	.....	cent	motor.	Pierce...	1,300	15	.....	grav.	seat..	dry-d..	selec.	unit-m.	3	10.33–1	worm..	rad-rd..	springs.	int.....	int.....	left..	cent..	Available..... 3
.....	.....	.....	cent	motor.	Pierce...	1,175	12	Stmbg	grav.	seat..	dry-d..	selec.	unit-m.	3	11.75–1	worm..	rad-rd..	springs.	int.....	int.....	left..	cent..	Available..... 5
.....	.....	.....	cent	motor.	.....	1,200	15	Ray...	.....	.....	dry-d..	selec.	unit-m.	3	7.75–1	dbl chn.	.....	rad-rd..	.....	.....	left..	cent..	Avery..... C
.....	.....	.....	l-b	motor.	.....	1,200	14½	Ray...	.....	.....	dry-d..	selec.	unit-j..	3	3.50–1	dbl chn.	.....	rad-rd..	.....	.....	right.	cent..	Avery..... B
.....	.....	.....	cent..	motor.	.....	1,200	13	Ray...	.....	.....	dry-p..	selec.	unit-j..	3	3.50–1	dbl chn.	.....	rad-rd..	.....	.....	right.	cent..	Avery..... B
.....	.....	.....	cent..	motor.	.....	1,200	12	Ray...	.....	.....	dry-d..	selec.	unit-j..	3	3.50–1	dbl chn.	.....	rad-rd..	.....	.....	right.	cent..	Avery..... A
.....	.....	.....	cent..	motor.	.....	1,000	10	Scheb..	.....	.....	wet-d..	selec.	unit-j..	3	12.50–1	dbl chn.	.....	rad-rd..	.....	.....	right.	cent..	Avery..... B
.....	.....	.....	cent..	motor.	Wauk'a..	1,000	12	King...	vac..	seat..	dry-p..	selec.	amid...	6	8.03–1	bevel-4.	rad-rd..	springs.	ext-r-w.	ext-sht.	rt*..	cent..	Beech Creek..... 3A
.....	.....	.....	.....	.....	none....	.....	.....	Scheb..	grav.	seat..	dry-d.	selec.	unit-m.	3	7.00–1	int-g...	springs.	springs.	int-r-w.	ext-r-w.	left..	cent	Bessemer..... G
.....	.....	.....	cent..	motor.	Pierce...	.....	.....	Ray...	grav.	seat..	cone..	selec.	amid...	3	7.75–1	worm..	springs.	springs.	int-r-w.	int-r-w.	left..	cent..	Bessemer..... D
.....	.....	.....	cent..	.....	Pierce...	.....	.....	Ray...	grav.	.....	cone..	selec.	amid...	3	10.33–1	worm..	rad-rd..	springs.	int-r-w.	int-r-w.	left..	cent	Bessemer..... E
.....	.....	.....	cent..	motor.	Pierce...	.....	.....	.....	grav.	seat..	cone..	selec.	amid...	3	13.00–1	worm..	rad-rd..	t-arm..	int-r-w.	ext-sht.	left..	cent..	Bessemer..... H
.....	.....	.....	cent..	motor.	Wauk'a..	1,060	14	Scheb..	grav.	seat..	cone..	ind-c.	amid...	3	7.67–1	worm..	sub-f..	sub-f..	int-r-w.	ext-sht.	right.	right.	Blair..... C
.....	.....	.....	cent..	motor.	Wauk'a..	970	12	Scheb..	grav.	seat..	cone..	ind-c.	amid...	3	8.67–1	worm..	sub-f..	sub-f..	int-r-w.	ext-sht.	right.	right.	Blair..... D
.....	.....	.....	cent..	motor.	Wauk'a..	870	10	Scheb..	grav.	seat..	cone..	ind-c.	amid...	3	9.33–1	worm..	sub-f..	sub-f..	int-r-w.	ext-sht.	right.	right.	Blair..... E
.....	.....	.....	cent..	motor.	Wauk'a..	870	10	Scheb..	grav.	seat..	cone..	ind-c.	amid...	3	9.33–1	worm..	sub-f..	sub-f..	int-r-w.	ext-sht.	right.	right.	Blair..... F
lighting.	.....	.....	cen*..	motor.	.....	.....	.....	.....	grav.	seat..	dry-d..	selec.	unit-m.	3	.....	worm..	.....	springs.	int.....	ext.....	.....	cent..	Brinton..... H
lighting.	.....	stock..	cent..	motor.	.....	.....	.....	.....	grav.	seat..	dry-d..	selec.	unit-m.	3	.....	worm..	springs.	springs.	int.....	ext.....	.....	cent.	Brinton..... F
s, l & i...	Spitdf..	stock	.....	.....	.....	.....	.....	.....	grav.	dash	cone..	selec.	unit-x..	3	4.23–1	bevel...	springs.	t-arm..	int-r-w.	ext-r-w.	left..	cent	Briscoe..... 4-24
.....	.....	.....	suct..	motor.	Mon'reh.	1,400	18	Scheb..	grav.	seat..	dry-d..	selec.	unit-m.	3	7.90–1	worm..	springs.	springs.	int-r-w.	int-r-w.	left..	cent..	Brockway..... O
.....	.....	.....	suct..	motor.	Mon'reh.	1,250	15	Scheb..	grav.	seat..	cone..	selec.	amid...	3	8.66–1	worm..	springs.	springs.	int-r-w.	ext-r-w.	left..	cent..	Brockway..... J-2
.....	.....	.....	suct..	motor.	Mon'reh.	1,250	15	Scheb..	grav.	seat..	cone..	selec.	amid...	3	8.66–1	worm..	springs.	springs.	int-r-w.	int-r-w.	left..	cent..	Brockway..... K-2
lighting.	.....	.....	suct..	motor.	Mon'reh.	1,200	12	Scheb..	grav.	seat..	dry-d..	selec.	amid...	3	10.33–1	worm..	rad-rd..	springs.	int-r-w.	int-r-w.	left..	cent..	Brockway..... R
lighting.	.....	stock..	.....	.....	none....	1,200	15	Zenith..	grav.	dash	cone..	selec.	unit-m.	3	8.50–1	int-g...	springs.	springs.	ext-sht.	ext-r-w.	right.	cent..	Burford..... O-3
lighting.	.....	stock..	cent..	motor.	Wauk'a..	1,000	13	Zenith..	vac..	seat..	dry-d..	selec.	amid...	4	13.10–1	worm..	rad-rd..	springs.	..r-w..	int-r-w.	right.	right.	Burford..... D-3
lighting*	.....	stock..	.....	.....	Her-Sp..	1,500	.....	Stmbg..	grav.	seat..	.....	elec..	.....	1	25.00–1	bevel-4.	rad-rd..	rad-rd..	.....	ext-4-w.	right.	c & r.	Couple Gear..... HC
lighting*	.....	stock..	c't*..	f-whl*..	Her-Sp*.	1,500	.....	Stmbg..	grav.	seat..	.....	elec..	amid...	1	25.00–1	bevel-4.	rad-rd..	rad-rd..	.....	ext-4-w.	right.	cent..	Couple Gear..... AC
.....	.....	.....	suct..	motor.	Mon'reh.	1,200	18	Stmbg..	grav.	seat..	dry-d..	selec.	unit-m.	3	.....	worm..	springs.	springs.	int-r-w.	int-r-w.	right.	cent..	Chase..... A
.....	.....	.....	suct..	motor.	Mon'reh.	1,000	15	Stmbg..	grav.	.....	dry-d..	selec.	unit-m.	3	.....	worm..	springs.	springs.	int-r-w.	int-r-w.	right.	cent..	Chase..... C
.....	.....	.....	suct..	motor.	Mon'reh.	1,000	15	Stmbg..	grav.	seat..	dry-d..	selec.	unit-m.	3	.....	worm..	springs.	springs.	int-r-w.	int-r-w.	right.	cent.	Chase..... B
.....	.....	.....	suct..	motor.	Mon'reh.	1,000	10	Stmbg..	grav.	.....	wet-d.	selec.	unit-m.	3	.....	worm..	springs.	springs.	int-r-w.	int-r-w.	right.	cent..	Chase..... X
.....	.....	.....	suct..	motor.	Mon'reh.	1,000	10	Stmbg..	grav.	seat..	wet-d.	selec.	unit-m.	4	.....	worm..	springs.	t-arm..	int.....	int.....	right.	cent..	Chase..... O
s, l & i...	Dyneto..	stock..	.....	.....	none....	.....	35	Carter*	grav.	.....	dry-p.	selec.	unit-m.	3	6.00–1	bevel...	springs.	t-arm..	int-r-w.	ext-r-w.	left..	cent	Collier..... M
none..	.....	.....	suct..	motor.	Mon'reh.	1,200	14	Shkspr.	grav.	.....	cone..	selec.	amid...	3	9.45–1	int-g...	springs.	springs.	int-r-w.	ext-r-w.	left..	cent..	Columbia..... E
s, l & i...	.....	100.00	.....	.....	none....	1,630	25	Zenith..	grav.	seat..	cone..	selec.	unit-m.	3	6.00–1	bevel...	springs.	t-arm..	int-r-w.	ext-r-w.	left..	cent..	Commerce..... N
s & l-2...	Remy..	stock..	cent..	d-shft..	Pierce...	1,383	20	Zenith..	vac..	seat..	cone..	selec.	unit-m.	3	7.00–1	int-g...	springs.	springs.	int-r-w.	ext-r-w.	left..	cent..	Commerce..... E
.....	.....	.....	suct..	motor.	.....	.....	.....	Stmbg..	.....	.....	dry-d..	selec.	unit-m.	3	7.75–1	worm..	springs.	springs.	.....	.....	left*	cent..	Continental (C)..... FL
.....	.....	.....	suct..	motor.	.....	.....	.....	Stmbg..	.....	.....	dry-d..	selec.	unit-m.	3	9.25–1	worm..	springs.	springs.	.....	.....	left*	cent..	Continental (C)..... HL
.....	.....	.....	suct..	motor.	.....	.....	.....	Stmbg..	.....	.....	dry-d..	selec.	unit-m.	3	9.25–1	worm..	springs.	springs.	.....	.....	left*	cent..	Continental (C)..... J
.....	.....	.....	suct..	motor.	.....	.....	18	Stmbg..	.....	.....	dry-d..	selec.	unit-m.	3	10.50–1	worm..	springs.	springs.	.....	.....	left*	cent..	Continental (C)..... M
.....	.....	.....	cent..	motor.	Pierce...	1,500	14	Stmbg..	grav.	seat..	dry-d..	selec.	unit-m.	3	8.66–1	worm..	springs.	springs.	int-r-w.	ext-r-w.	left..	cent..	Corbitt..... D
.....	.....	.....	cent..	motor.	Pierce...	1,500	14	Stmbg..	grav.	seat..	dry-d..	selec.	unit-m.	3	8.66–1	worm..	springs.	springs.	int-r-w.	ext-r-w.	left..	cent..	Corbitt..... C
.....	.....	.....	cent..	motor.	Pierce...	1,500	14	Stmbg..	grav.	seat..	dry-d..	selec.	unit-m.	3	8.66–1	worm..	springs.	springs.	int-r-w.	ext-r-w.	left..	cent.	Corbitt..... B

ABBREVIATIONS: (continued).—*Allis-Chalmers*; G & D, *Gray & Davis*; Westghs, *Westinghouse*; N-East, *Northeast*; Huff-S, *Huff-Simms*; Spl-App, *Splitdorf-Apple*. **Governor Type** cent, c't, *centrifugal*; suct, *suction or gas velocity*; l-b, *loose-ball*; hydr, *hydraulic*. **Governor Drive** motor, *from motor*; d-shft, *from driveshaft*; duplex, *from both motor and driveshaft or front wheel*; f-wheel, f-whl, *from front wheel*. **Governor Make** Wauk'a, *Waukesha*; Mon'reh, Mon, *Monarch*; Her-Sp, *Herschell-Spillman*; Milwkee, *Milwaukee*. **Carbureter Make,** Scheb, *Schebler*; Ray, *Rayfield*; Stmbg, *Stromberg*; Shkspr, *Shakespeare*; Flech, *Flechter*; Zen, *Zenith*, Johns, *Johnson*. **Fuel Feed,** grav, *gravity*; vac, *vacuum*; pres, *pressure*. **Tank Location,** seat, *under seat*; dash, *in dash*; rear, *at rear*; r-bd, *on running-board*. **Clutch Type,** dry-d, *dry multiple disk*; dry-p, *dry plate:* wet-d, *multiple-disk in oil*; wet-p, *plate-in-oil*. **Gearset Type,** selec, *selective sliding gear*; prog, *progressive sliding gear*; ind-c, *individual clutch, constant-mesh*; plan, *planetary*; fric, *friction*; elec, *electric*. **Gearset Location,** amid, *amidships*; unit-m, *unit with motor*; unit-j, *unit with jackshaft*; unit-x, *unit with axle*. **Final Drive,** int-g, *internal-gear*; worm, *top worm*; dbl chn, *double side chains*; sp-bevel, *spiral bevel*; db-red, *double-reduction, bevel and spur gears*; ext-g, *external-gear*; -f, *to front wheels*; -4, *on all four wheels*. **Propulsion Taken By,** rad-rd, *radius rods*; tor-t, *torsion-tube*; sub-f, *sub-frame*; spg's, *springs*. **Torque Taken By,** rad-rd, *radius rods*; tor-t, *torsion-tube*; t-arm, *torque-arm*; sub-f, *sub-frame*; sp'gs, *springs*. **Brakes, Type,** ext, ex, *external contracting*; int, *internal expanding*. **Brake Location,** -r-w, *rear wheel*: -sht, *shaft*; -f-w, *front wheel*; -j-s, *jackshaft*; -4-w, *on all four wheels*. **Control, Levers,** cent, *center*; c & r, *gearshift center, brake right*; c & l, *gearshift center, brake left*.

Technical Specifications of Gasoline

Name and Model	Capacity in Pounds	Price of Chassis	Wheel base in Inches	FRAME		TIRES			Wheels	MOTOR									
				Material	Construction	Kind	SIZES IN INCHES			No. of Crankshaft Bearings	Bore and Stroke	N.A.C.C. Hp.	Cylinders Cast	Valves Placed	COOLING		IGNITION		
							Front	Rear							Water Circulation	Radiator Core and Case	Type	Make	Spark Advance
Corbitt....A	7,000	$3,200	168	pr-steel..	rigid....	solid....	36x5	36x5d	wood-sq.	3	4-4½x5½	32.40	pairs....	right...	cent...	fin-cast....	sing...	Eisemann..	hand....
Corliss....A	1,000	800-c*	100	pr-steel..	rigid....	pneu....	31x4	31x4	wood-ov.	2	4-3½x4½	15.64	block...	left....	thermo.	fin-sheet..	sing...	Dixie.....	hand....
Croce....17	1,000	825	108	pr-steel..	.....	p. & s....	32x4	32x4	wood-sq.	2	4-3½x5	16.92	block...	left....	cent...	sq-t-sheet..	sing...	Bosch.....	fixed....
Crowther-Duryea.....	1,200	600-c	110	pr-steel..	semi-flx..	pneu....	32x3½	32x3½	wood-ov.	4	4-3½x4½	22.50	sing.....	head...	thermo.	cell-sheet..	dual..	Dixie.....	hand....
Dart....B-B	1,500	1,200	124	pr-steel..	flexible..	solid....	34x3	34x3½	wood-sq.	3	4-3½x5½	19.61	block...	right...	thermo	cell-sheet..	sing...	Eisemann..	fixed....
Dart....E	3,000	1,800	130	pr-steel..	flexible..	solid....	34x3½	34x5	wood-sq.	3	4-3½x5½	22.50	block...	right...	thermo.	cell-sheet..	sing...	Eisemann.	fixed....
Dart....C-C	5,000	2,470	150	pr-steel..	flexible..	solid....	36x4	36x4d	wood-sq.	3	4-4½x5½	27.20	block...	right...	cent...	cell-sheet..	sing...	Eisemann.	fixed....
D-E....Junior	1,250	895	108	pr-steel..	rigid....	pneu....	33x4	33x4	wood-ov.	2	4-3½x4½	15.64	block...	right...	thermo.	fin-sheet..	sing...	Dixie.....	hand....
D-E....Senior	2,000	1,450	128*	pr-steel..	rigid....	solid....	34x3½	34x4	wood-sq.	3	4-3½x5	19.61	block...	right...	thermo.	fin-sheet..	sing...	Dixie.....	hand....
DeKalb....D-1½	4,000	2,100	134*	pr-steel..	flexible..	solid....	34x4	36x5	wood-sq.	3	4-4½x5½	27.20	block...	left....	cent...	cell-sheet..	sing...	Eisemann.	hand....
DeKalb....D-2½	5,000	2,450	136*	pr-steel..	flexible..	solid....	36x4	36x6	wood-sq.	3	4-4½x5½	27.20	block...	left....	cent...	cell-sheet..	sing...	Eisemann.	hand....
Denby....R	2,000	990	119	rolled-c..	semi-flx	pneu*...	34x4½*	34x4½*	wood-sq.	2	4-3½x4½	15.64	block...	right...	thermo.	cell-cast...	sing...	Dixie.....	fixed....
Denby....G	3,000	1,575	120*	pr-steel..	semi-flx..	solid....	35x3½	35x5	wood-sq.	3	4-3½x5	19.61	block...	right...	thermo.	cell-cast...	sing...	Eisemann.	fixed....
Denby....H	4,000	1,790	144*	pr-steel..	semi-flx..	solid....	36x3½	36x3½d*	wood-sq.	3	4-3½x5	22.50	block...	right...	thermo.	cell-cast...	sing...	Eisemann.	fixed....
Denby....K	5,000	2,090	144*	pr-steel..	semi-flx..	solid....	36x4	36x4d*	wood-sq.	3	4-3½x5	22.50	block...	right...	thermo.	cell-cast...	sing...	Eisemann.	fixed....
Dispatch....G	1,200	1,150	120	wood....	flexible..	pneu....	36x3½	36x3½	wood-ov.	3	4-3½x5	22.50	block...	left....	thermo.	cell-sheet..	sing...	Bosch.....	hand....
Doane.....	5,000	3,000-c	150	rolled-c..	flexible..	solid....	36x4	36x7	wood-sq.	3	4-4½x5½	29.00	pairs....	right...	cent...	fin-cast....	sing...	Bosch.....	auto....
Doane.....	12,000	4,500-c	178	rolled-I..	flexible..	solid....	36x6	38x6d	wood-sq.	3	4-4½x6½	36.15	pairs....	left....	cent...	fin-cast....	sing...	Bosch.....	auto....
Dorris....I-B-4	1,500	1,900	132	pr-steel..	semi-flx..	pneu....	36x4	36x4½	wood-ov.	3	4-4½x5	30.65	pairs....	head...	cent...	z-z-t-sheet	dual..	Bosch.....	hand....
Dorris....I-B-W	4,000	1,990	132	pr-steel..	semi-flx..	pneu....	36x4	36x4d	wood-sq.	3	4-4½x5	30.65	pairs....	head...	cent...	z-z-t-sheet	sing...	Bosch.....	hand....
Ellsworth....25-A	1,000	695-c	108	pr-steel..	flexible..	pneu....	30x3½	30x3½	wood-ov.	2	4-3½x5	16.92	block...	right...	thermo.	sq-t-sheet..	sing...	storage....	hand..
Federal....S	2,000	.....	132	pr-steel..	semi-flx..	solid*..	34x3*	34x4*	wood-ov.	5	4-3½x5½	19.61	block...	right...	cent...	fin-sheet...	sing...	Eisemann.	fixed....
Federal....J-M	3,000	1,800	144*	pr-steel..	semi-flx..	solid....	36x3½	36x5	wood-sq.	3	4-4½x5½	27.20	block...	left....	cent...	cell-cast...	sing...	Eisemann.	fixed....
Federal....O-P	4,000	2,100	144*	pr-steel..	semi-flx..	solid....	36x4	36x7*	wood-sq.	3	4-4½x5½	27.20	block...	left....	cent...	cell-cast...	sing...	Eisemann.	fixed....
Federal....L	7,000	2,800*	146*	rolled-c..	semi-flx.	solid....	36x5	36x5d	wood-sq*	3	4-4½x5½	32.40	pairs....	left....	cent...	fin-cast....	sing...	Eisemann.	fixed....
Federal....W	10,000	.....	156*	rolled-c..	semi-flx	solid....	36x6	40x6d*	cast-hol.	5	4-4½x5½	29.00	block...	right...	cent...	fin-sheet*..	sing...	Eisemann.	fixed....
Forschler.....	2,000	1,650	130	rolled-c..	flexible..	solid*...	36x3	36x4	wood-sq.	3	4-3½x5	19.61	block...	right...	cent...	sq-t-sheet.	sing...	Bosch.....	fixed....
Forschler.....	4,000	2,250	140*	rolled-c..	flexible..	solid*...	34x3½	34x5	wood-sq.	3	4-4½x5½	27.20	block...	left....	cent...	sq-t-sheet.	sing...	Bosch.....	fixed....
F. W. D....B	6,000	4,000	124	pr-steel..	.....	solid....	36x6	36x6	wood-ov.	3	4-4½x5½	36.15	pairs....	opp....	cent...	sq-t-sheet.	sing...	Eisemann.	hand....
Garford....75	2,000	1,450	120	pr-steel..	semi-flx	p. & s...	34x4½	36x3½	wood-ov.	3	4-3½x5½	19.61	block...	right...	thermo.	cell-sheet..	sing...	Dixie.....	hand....
Garford....66	3,000	1,800	142*	pr-steel..	semi-flx..	solid....	36x3½	36x5	wood-ov.	3	4-3½x5½	22.50	block...	right...	cent...	cell-sheet.	sing...	Dixie.....	hand....
Garford....70	4,000	2,300	142*	pr-steel..	semi-flx..	solid....	36x4	36x4d	wood-ov.	3	4-4½x5½	29.00	block...	right...	cent...	fin-cast....	sing...	Dixie.....	hand....
Garford....77-B	7,000	3,400	128*	pr-steel..	semi-flx..	solid....	36x5	40x5d	wood-ov.	3	4-4½x6	29.00	block...	right...	cent...	cell-sheet..	sing...	Bosch.....	hand....
Garford....68	10,000	4,300	128*	pr-steel..	semi-flx..	solid....	36x6	40x6d	wood-ov.	3	4-4½x5½	36.15	pairs....	opp....	cent...	fin-cast....	sing...	Bosch.....	hand....
Garford....69	12,000	4,500	128*	pr-steel..	semi-flx..	solid....	36x6	40x7d	wood-ov.	3	4-5 1/16x5½	41.61	pairs....	opp....	cent...	fin-cast....	sing...	Bosch.....	hand....
G. A. Schacht.....	3,000	2,650	138*	rolled-c..	flexible..	solid....	38x3½	38x6	wood-sq.	3	4-4½x5½	29.00	block...	right...	cent...	cell-sheet.	sing...	Bosch.....	hand....
G. A. Schacht.....	4,000	2,800	144*	rolled-c..	flexible..	solid....	38x4	38x4d	wood-sq.	3	4-4½x5½	29.00	block...	right...	cent...	z-z-t-cast.	sing...	Bosch.....	hand....
G. A. Schacht.....	6,000	3,200	168*	rolled-c..	flexible..	solid....	38x5	38x5d	wood-sq.	3	4-4½x5½	29.00	block...	right...	cent...	z-z-t-cast.	sing...	Bosch.....	hand....
G. V.-Mercedes....F.V.	12,000	.....	192¼	pr-steel..	rigid....	solid....	34x5	40x6d	cast-d...	3	4-4½x5 5/16*	29.00	pairs....	head...	cent...	sq-t-cast..	sing...	Bosch.....	fixed..
Gersix....C	5,000	2,500	150*	rolled-c..	rigid....	solid....	36x4	36x7	wood-ov.	4	6-3½x5½	33.75	block...	left....	cent...	cell-cast...	sing...	Westghs..	hand....
Globe.....	2,500	1,375	130*	rolled-c..	semi-flx..	solid....	34x3½	34x4	wood-sq.	3	6-3½x4½	25.39	block...	left....	cent...	fin-cast....	sing...	Dixie.....	fixed..
G. M. C....15	1,500	1,090	122	pr-steel..	rigid....	pneu....	35x5	35x5	wood-ov.	3	4-3½x5	19.61	block...	right...	cent...	fin-sheet..	sing...	Eisemann.	hand....
G. M. C....21	2,000	.....	136	pr-steel..	semi-flx	solid....	34x3½	34x5	wood-ov.	3	4-3½x5	22.50	block...	left....	cent...	fin-cast....	sing...	Eisemann.	hand....
G. M. C....31	3,000	1,900	144*	pr-steel..	rigid....	solid....	36x3½	36x5	wood-ov.	3	4-3½x5	22.50	block...	right...	cent...	fin-cast....	sing...	Eisemann.	hand....
G. M. C....41	4,000	2,375	158*	pr-steel..	rigid....	solid....	36x4	36x4d	wood-ov	3	4-4½x5½	27.20	block...	right...	cent...	fin-cast....	sing...	Eisemann.	hand....
G. M. C....71	7,000	3,300	163*	rolled-c..	rigid....	solid....	36x5	40x5d	wood-sq.	3	4-4½x5½	32.40	pairs....	left....	cent...	fin-cast....	sing...	Eisemann.	hand....
G. M. C....101	10,000	3,850	163*	rolled-c..	rigid....	solid....	36x6	40x6d	wood-sq.	3	4-4½x5½	32.40	pairs....	left....	cent...	fin-cast....	sing...	Eisemann.	hand....
Gramm-Bernstein.....	2,000	1,650	124*	pr-steel..	semi-flx	solid....	34x3½	34x4	wood-sq.	3	4-3½x5½	22.50	block...	right...	thermo.	fin-cast....	sing...	Eisemann.	hand....
Gramm-Bernstein.....	3,000	2,000	130*	pr-steel..	semi-flx	solid....	34x3½	36x4	wood-sq.	3	4-3½x5½	22.50	block...	right...	thermo.	fin-cast....	sing...	Eisemann.	hand....
Gramm-Bernstein.....	4,000	2,300	146	pr-steel..	semi-flx	solid....	34x4	34x3½d	wood-sq.	3	4-3½x5½	22.50	block...	right...	thermo.	fin-cast....	sing...	Eisemann.	hand....
Gramm-Bernstein.....	5,000	2,700	156	pr-steel..	semi-flx	solid....	36x4	36x4d	wood-sq.	3	4-4½x5½	29.00	pairs....	left....	cent...	fin-cast....	dual..	Eisemann.	hand....
Gramm-Bernstein.....	7,000	3,400	158*	pr-steel..	semi-flx	solid....	36x5	40x5d	cast-hol.	3	4-4½x5½	29.00	pairs....	left....	cent...	fin-cast....	dual..	Eisemann.	hand....
Gramm-Bernstein.....	10,000	4,300	168*	pr-steel..	semi-flx	solid....	36x6	40x6d	cast-hol.	3	4-4½x6½	32.40	pairs....	left....	cent...	fin-cast....	dual..	Eisemann.	hand....
Gramm-Bernstein.....	12,000	4,500	168*	pr-steel..	semi-flx..	solid....	36x6	40x7d	cast-hol..	3	4-4½x6½	32.40	pairs....	left....	cent...	fin-cast....	dual..	Eisemann.	hand....
Hahn....C	2,000	1,750	136*	pr-steel..	.....	solid....	36x3½	36x5	wood-ov.	3	4-4½x5½	2.20	block...	left....	cent...	sq-t-sheet..	dual..	Bosch.....	hand....
Hahn....E	4,000	2,250	144*	pr-steel..	.....	solid....	36x4	36x4d	wood-ov.	3	4-4½x5½	32.40	pairs....	left....	cent...	sq-t-sheet..	dual..	Bosch.....	hand....
Hall.....	4,000	2,000	132	rolled-c..	semi-flx..	solid....	36x4	36x4d	wood-sq*	3	4-4½x5½	27.20	block...	left....	cent...	fin-cast....	sing...	Bosch*	fixed....
Hall.....	7,500	2,800	144	rolled-c..	semi-flx..	solid....	36x5	36x5d	wood-sq*	3	4-4½x5½	32.40	pairs....	left....	cent...	fin-cast....	sing...	Bosch*	fixed....
Hall.....	10,000	3,400	144	rolled-c..	semi-flx..	solid....	36x5	40x6d	wood-sq*	3	4-4½x5½	32.40	pairs....	left....	cent...	fin-cast....	sing...	Bosch*....	fixed....
Harrison....C	7,000	.....	.....	rolled-c..	rigid....	solid....	37x5	37x4½d	wood-ov.	3	4-4½x5	32.40	pairs....	right...	cent...	....sheet..	dual..	Bosch.....	hand....
Harrison....F	7,000	.....	.....	rolled-c..	rigid....	solid....	37x5	37x5d	wood-sq.	3	4-4½x5	32.40	pairs....	right...	cent...	sq-t-sheet..	dual..	Bosch.....	hand....
Harvey....W-F	4,000	2,250	150	rolled-c..	semi-flx..	solid....	36x4	36x6	wood-sq.	3	4-4½x5½	29.00	block...	right...	cent...	sq-t-sheet..	sing...	Eisemann.	auto....
Harvey....W-H	7,000	2,950	160*	rolled-c..	semi-flx..	solid....	36x5	36x5d	wood-sq.	3	4-4½x6	29.00	block...	right...	cent...	sq-t-sheet..	sing...	Eisemann.	auto....
Harvey....W-K	10,000	3,600	160*	rolled-c..	semi-flx..	solid....	36x6	40x6d	wood-sq.	3	4-4½x6	32.40	block...	right...	cent...	sq-t-sheet..	sing...	Eisemann.	auto....
Hawkeye....H	2,500	1,300	136*	rolled-c..	.....	solid....	34x3½	34x5	wood-sq.	3	4-3½x5	22.50	block...	head...	gear...	fin-cast....	sing...	Eisemann.	hand....
Horner.....	3,000	2,250	145	pr-steel..	rigid....	solid....	36x4	36x4	wood-sq.	3	4-4½x5½	27.20	block...	.....	cent...	fin-cast....	dual..	.....	hand....
Horner.....	4,000	2,650	145	pr-steel..	rigid....	solid....	36x4	36x3½d	wood-sq.	3	4-4½x5½	27.20	block...	.....	cent...	fin-cast....	dual..	.....	hand....

ABBREVIATIONS: General, *, *with other options;* opt, *optional;* **Price,** -c, *complete with body.* **Frame, Material,** pr-steel, *pressed steel;* rolled-c, *rolled steel, channel section;* rolled-I, *rolled steel, I section;* **Frame Construction,** semi-flx, *semi flexible.* **Tires, kind,** Pneu, *pneumatic;* cush, *cushion,* p & s. *pneumatic front, solid, rear;* s & st, *solid rubber front, steel in rear.* **Tire Sizes,** -d, *dual.* **Wheels,** pr-steel, *pressed steel;* -ov, *oval spokes;* -sq, *square spokes;* -d, *disk or web type;* -hol, *hollow spokes;* -cr, *cruciform spokes;* -x, *cross-shaped solid spokes.* **Cylinders cast,** sing, *singly or individually.* **Location of valves,** opp, *opposite, T-head motor;* r & h, *one valve at right, the other in head, L-head motor;* l & h, *one valve at left the other in head, L-head motor.* **Water circulation,** cent, *centrifugal pump;* thermo-, *thermo-syphon or natural circulation;* gear, *gear pump.* **Radiator Type,** fin, *individually finned tubes;* sq-t, *square-tubular, resembling cellular, sometimes known as flat-tubular;* z-z-t, *zig-zag tubular, resembling cellular;* cell, *cellular or honeycomb type;* tube, *plain tubes without fins;* ring, *tubes arranged in ring about blower fan.* **Radiator Case,** -sheet, *sheet metal;* -cast, *cast metal, built up.* **Ignition Type,** sing, *single;* doub, *double,* dual-d, *dual-double.* **Make of Magneto** (or other sparking device), Conn., *Connecticut;* storage, *storage battery;* Westghs, *Westinghouse;* G & D, *Gray & Davis;* At Kent, *Atwater Kent.* **Spark Advance,** auto, *automatic;* 2-pt-fix, *two-point fixed, battery circuit in retard, magneto in advance.* **Electric System Type,** s, l & i, *starting, lighting and ignition, combination unit;* s & l, *starting and lighting, combination unit;* s & l-2, *starting and lighting, two-unit;* l & i, *lighting and ignition, combination unit.* **Electric System, Make,** Splitdf, *Splitdorf;* Al-Chal,—**(Abbreviations Continued on Opposite Page.)**

Commercial Vehicles for 1917—Continued

MOTOR										TRANSMISSION							BRAKES		CONTROL		
ELECTRIC SYSTEM			GOVERNOR			SPEED		FUEL SYSTEM			GEARSET			Total Gear Reduction in High	Final Drive	Propulsion Taken By	Torque Taken By					Name and Model
Type	Make	Extra Cost	Type	Drive	Make	Motor in r. p. m.	Truck in m. p. h.	Carburetor Make	Fuel Feed	Tank Location	Clutch Type	Type	Location	Sp'ds						Steer	Levers	
.....	.....	.....	cent..	motor..	Pierce...	1,500	14	Stmbg..	grav.	seat..	wet-d.	ind-c.	amid...	3	8.75–1	worm..	springs.	springs.	int.....	int.....	left..	cent..	Corbitt.....A
.....	.....	.....	.....	.....	.....	.....	.....	Scheb..	grav.	dash.	dry-d..	selec.	unit-m.	3	4.50–1	bevel..	tor-t . .	tor-t...	int-r-w.	int-r-w.	left..	cent..	Corliss.....A
.....	.....	.....	.....	.....	none....	1,000	17½	Zenith..	grav.	seat..	dry-d..	selec.	unit-m.	3	5.00–1	bevel..	springs.	springs.	int.....	ext-r-w.	left..	cent..	Croce.....17
s,l&i...	Splitdf..	stock...	.....	.....	none....	2,500	40	Scheb..	grav.	dash.	.....	roller	unit-x..	.....	.....	roller..	sub-f...	sub-f...	ext-r-w.	.....	left..	c&l..	Crowther-Duryea.....
none....	.....	.....	.....	.....	none....	.....	.....	.....	vac..	seat..	dry-d..	selec.	unit-m.	3	7.75–1	worm..	springs.	springs.	int-r-w.	int-r-w.	left..	cent..	Dart.....B–B
.....	.....	.....	.....	.....	none....	.....	.....	Stmbg..	vac..	seat..	dry-d..	selec.	unit-m	3	7.00–1	worm..	springs.	springs.	int-r-w.	int-r-w.	left..	cent..	Dart.....E
none....	.....	.....	cent..	duplex..	Duplex*.	.....	.....	Stmbg..	vac..	seat..	dry-d..	selec.	unit-m.	4	9.25–1	worm...	springs.	springs.	int-r-w.	int-r-w.	left..	cent..	Dart.....C–C
s&l....	Al-Chal..	85.00	.....	.....	.....	.....	.....	Scheb..	vac..	.....	dry-d..	selec.	unit-m.	3	6.20–1	worm..	springs.	springs.	int-r-w.	int-r-w.	left..	cent..	D–E.....Junior
.....	.....	.....	suct..	motor..	Mon'rch.	1,250	16	Zenith..	vac..	seat..	dry-d..	selec.	unit-m.	3	7.80–1	worm..	springs.	springs.	int-r-w.	int-r-w.	left..	cent..	D–E.....Senior
none....	.....	.....	cent..	motor..	Pierce...	1,800	15	Master.	grav.	seat..	cone..	selec.	unit-m.	3	6.83–1	worm..	springs.	springs.	int-r-w.	int-r-w.	left..	cent..	DeKalb.....D-1½
none....	.....	.....	cent..	motor..	Pierce...	1,800	13	Master.	grav.	seat..	dry-d..	selec.	unit-m.	3	8.25–1	worm..	springs.	springs.	int-r-w.	int-r-w.	left..	cent..	DeKalb.....D-2½
s&l....	Al-Chal..	85.00	cent..	motor..	Milwk...	1,800*	22*	Zenith..	grav.	dash.	dry-d..	selec.	unit-m.	3	8.20–1	int-g...	springs.	springs.	int-r-w.	ext-r-w.	left..	cent..	Denby.....R
s&l-2...	G & D...	135.00	cent..	motor..	Pierce...	1,440	17	Stmbg..	grav.	dash.	dry-d..	selec.	unit-m.	3	8.80–1	int-g...	springs.	springs.	int-r-w.	ext-r-w.	left..	cent..	Denby.....G
s&l-2...	G & D...	135.00	cent..	motor..	Pierce...	1,320	15	Stmbg..	grav.	.....	dry-d..	selec.	unit-m.	3	9.45–1	int-g...	springs.	springs.	int-r-w.	ext-r-w.	left..	cent..	Denby.....H
s&l-2...	G & D...	135.00	cent..	motor..	Pierce...	1,240	14	Stmbg..	grav.	.....	dry-d..	selec.	unit-m.	3	9.45–1	int-g...	springs.	springs.	int-r-w.	ext-r-w.	left..	c&l..	Denby.....K
s&l....	U.S.L..	stock...	.....	.....	.....	2,000	25	Ray...	vac..	rear..	none..	fric..	amid...	4	9.00–1	dbl chn.	rad-rd..	springs.	int-r-w.	int-r-w.	right.	cent..	Dispatch.....G
.....	.....	.....	.....	.....	Wauk'a..	1,000	14	Holley..	grav.	.....	dry-d..	selec.	unit-m.	3	8.00–1	dbl chn.	rad-rd..	.....	int.....	ext....	right.	cent..	Doane.....
.....	.....	.....	cent..	motor..	Wauk'a..	1,000	10	Holley..	grav.	seat..	dry-d..	selec.	unit-m.	3	10.50–1	dbl chn.	rad-rd..	.....	int.....	ext....	right.	cent..	Doane.....
lighting.	Westghs.	stock...	.....	.....	.....	.....	.....	Stmbg..	vac.	.....	dry-d..	prog.	unit-m.	3	4.08–1	sp-bev..	springs.	t-arm..	int-r-w.	ext-r-w.	left..	cent..	Dorris.....I–B–4
.....	.....	.....	cent..	motor..	Pierce...	1,085	15	Stmbg..	grav.	seat..	dry-d..	selec.	unit-m.	3	7.75–1	worm..	springs.	springs.	int-r-w.	int-r-w.	left..	cent.	Dorris.....I–B–W
s,l&i...	Apple...	stock...	.....	.....	.....	.....	.....	Carter..	grav.	seat..	cone..	selec.	unit-m.	3	4.46–1	bevel..	springs.	tor-t...	int-r-w.	int-r-w.	left..	cent..	Ellsworth.....25–A
s,l&i*..	.....	opt....	c't*..	motor*	Simplex*	1,067*	18*	Zenith..	grav.	seat..	dry-p..	selec.	amid...	3	6.00–1	worm..	rad-rd..	springs.	int-r-w.	int-r-w.	left*	cent..	Federal.....S
s&l-2...	Westghs.	245.00	cent..	motor..	own.....	1,190	15	Stmbg..	grav.	seat..	cone..	selec.	amid...	3	8.50–1	worm..	rad-rd..	springs.	int-r-w.	int-r-w.	left..	cent..	Federal.....J–M
s&l-2...	Westghs.	150.00	cent..	motor..	own.....	1,031	13	Stmbg..	grav.	seat..	cone..	selec.	amid...	3	8.50–1	worm..	rad-rd..	springs.	int-r-w.	int-r-w.	left..	cent..	Federal.....O–P
lighting.	Westghs.	150.00	cent..	motor..	own.....	1,160	12	Stmbg..	grav.	seat..	dry-d..	selec.	unit-m.	3	10.33–1	worm..	rad-rd..	springs.	int-r-w.	int-r-w.	right.	cent..	Federal.....L
s,l&i*..	.....	opt....	cent..	motor..	Simplex	1,000	10	Zenith..	grav.	seat..	dry-p..	selec.	amid...	4	11.60–1	worm..	rad-rd..	springs.	int-r-w.	int-r-w.	left*	cent..	Federal.....W
.....	.....	.....	suct..	motor..	Mon'rch.	1,200	16	Zenith..	grav.	seat..	dry-d..	selec.	unit-m.	3	7.75–1	worm..	springs.	springs.	int-r-w.	int-r-w.	left..	cent..	Forschler.....
.....	.....	.....	cent..	motor..	Pierce...	1,200	12	Zenith..	grav.	seat..	dry-d..	selec.	unit-m.	3	7.75–1	worm..	springs.	springs.	int-r-w.	int-r-w.	left..	cent..	Forschler.....
s&l....	N-East..	300.00	cent..	motor..	Pierce...	1,100	14	Stmbg..	grav.	seat..	wet-d.	ind-c.	amid...	3	8.90–1	bevel-4.	springs.	t-arm..	ext-r-w.	ext-sht.	right.	right.	F. W. D.....B
s&l....	Westghs.	175.00	suct..	motor..	Mon'rch.	1,238	17	Ray...	grav.	seat..	dry-d..	selec.	unit-m.	3	7.80–1	worm..	springs.	springs.	int-r-w.	int-r-w.	right.	cent..	Garford.....75
s&l....	Westghs.	175.00	suct..	motor..	Mon rch.	1,111	14	Ray...	grav.	seat..	dry-d..	selec.	amid...	3	8.50–1	worm..	springs.	springs.	int-r-w.	ext-r-w.	right.	cent..	Garford.....66
s&l....	Westghs.	175.00	suct..	motor..	Mon'rch.	934	13	Ray....	grav.	seat..	dry-d..	selec.	amid...	3	7.75–1	worm..	springs.	springs.	int-r-w.	ext-r-w.	right.	cent..	Garford.....70
s&l....	Westghs.	175.00	cent..	motor..	own.....	1,041	12	Ray...	grav.	seat..	dry-d..	selec.	amid...	4	10.33–1	worm..	rad-rd..	springs.	ext-sht.	int-r-w.	right.	cent..	Garford.....77–B
none....	.....	.....	suct..	motor..	own.....	1,005.	9	Ray...	grav.	seat..	dry-d..	selec.	unit-j..	4	13.31–1	dbl chn.	rad-rd..	.....	int-r-w.	ext-sht.	right.	right.	Garford.....68
none....	.....	.....	suct..	motor..	own.....	.920	8	Ray...	grav.	seat..	dry-d..	selec.	unit-j..	4	13.31–1	dbl chn.	rad-rd..	.....	int-r-w.	int-sht..	right.	right.	Garford.....69
.....	.....	.....	cent..	motor..	own.....	900	16	Scheb..	grav.	seat..	cone..	selec.	amid...	3	7.75–1	worm..	rad-rd..	t-arm..	int-r-w.	ext-r-w.	left..	cent..	G. A. Schacht.....
.....	.....	.....	cent..	motor..	own.....	900	15	Scheb..	grav.	seat..	cone..	selec.	amid...	3	8.67–1	worm..	rad-rd..	t-arm..	int-r-w.	ext-r-w.	left..	cent..	G. A. Schacht.....
.....	.....	.....	cent..	motor..	own.....	900	12	Scheb..	grav.	seat..	cone..	selec.	amid...	3	9.67–1	worm..	rad-rd..	t-arm..	int-r-w.	ext-r-w.	left..	cent..	G. A. Schacht.....
.....	.....	.....	cent..	motor..	own.....	850	10	own....	pres.	seat..	cone..	selec.	amid...	4	9.36–1	int-g...	rad-rd..	t-arm..	ext-r-w.	ext-sht.	right.	right.	G. V.–Mercedes....F.V.
s&l-2...	Westghs.	stock...	suct..	motor..	Mon'rch.	1,050	13	Ray...	vac..	seat..	dry-p..	ind-c.	unit-m.	3	8.66–1	worm..	springs.	springs.	int-r-w.	ext-r-w.	left..	cent..	Gersix.....C
.....	.....	.....	cent..	d-shft..	Pierce...	3,400	25	Master.	vac..	seat..	dry-d..	selec.	unit-m.	3	7.40–1	int-g...	springs.	springs.	int-r-w.	ext-r-w.	left..	cent.	Globe.....
none....	.....	.....	suct..	motor..	Mon'rch.	1,150	20	Marvel.	grav.	seat..	cone..	selec.	amid...	3	6.00–1	bevel..	tor-t...	tor-t...	int-r-w.	ext-r-w.	left..	cent..	G. M. C.....15
none....	.....	.....	suct..	motor..	Mon'rch.	1,380	18	Marvel.	grav.	seat..	dry-d..	selec.	unit-m.	3	7.75–1	worm..	springs.	springs.	int-r-w.	int-r-w.	left..	cent..	G. M. C.....21
none....	.....	.....	suct..	motor..	Mon'rch.	1,150	15	Marvel.	grav.	seat..	dry-d..	selec.	unit-m.	4	9.25–1	worm..	rad-rd..	springs.	int-r-w.	int-r-w.	left..	cent..	G. M. C.....31
none....	.....	.....	suct..	motor..	Mon'rch.	1,200	14	Marvel.	grav.	seat..	dry-d..	selec.	unit-m.	4	9.25–1	worm..	rad-rd..	springs.	int-r-w.	int-r-w.	left..	cent..	G. M. C.....41
none....	.....	.....	suct..	motor..	Mon'rch.	1,250	12	Marvel.	grav.	seat..	dry-d..	selec.	amid...	4	12.00–1	worm..	rad-rd..	springs.	int-r-w.	int-r-w.	left..	cent..	G. M. C.....71
none....	.....	.....	suct..	motor..	Mon'rch.	1,250	10	Marvel.	grav.	seat..	dry-d..	selec.	amid...	4	13.67–1	worm..	rad-rd..	springs.	int-r-w.	int-r-w.	left..	cent..	G. M. C.....101
s&l-2*..	Westghs.	200.00*	l-b..	motor..	Wauk'a..	1,200	19	Zenith..	grav.	seat..	dry-d..	ind-c.	amid...	3	6.50–1	worm..	springs.	springs.	int-r-w.	int-r-w.	left..	cent..	Gramm–Bernstein.....
s&l-2*..	Westghs.	200.00*	l-b..	motor..	Wuak'a..	1,200	17	Zenith..	grav.	seat..	dry-d..	ind-c.	amid...	3	7.75–1	worm..	springs.	springs.	int-r-w.	ext-r-w.	left..	cent..	Gramm–Bernstein.....
s&l-2*..	Westghs.	200.00*	l-b..	motor..	Wauk'a..	1,200	14	Zenith..	grav.	seat..	dry-d..	ind-c.	amid...	3	8.60–1	worm..	springs.	springs.	int-r-w.	ext-r-w.	left..	cent..	Gramm–Bernstein.....
s&l-2*..	Westghs.	200.00*	cent..	motor..	Wauk'a..	1,000	14	Zenith..	grav.	seat..	dry-d..	ind-c.	amid...	3	7.75–1	worm..	springs.	springs.	int-r-w.	ext-r-w.	left..	cent..	Gramm–Bernstein.....
s&l-2*..	Westghs.	200.00*	cent..	motor..	Wauk'a..	1,000	14	Zenith..	grav.	seat..	dry-d..	ind-c.	amid...	4	8.75–1	worm..	springs.	springs.	int-r-w.	int-r-w.	left..	cent..	Gramm–Bernstein.....
s&l-2*..	Westghs.	200.00*	cent..	motor..	Wauk'a..	1,000	10	Zenith..	grav.	seat..	cone..	ind-c.	amid...	4	11.75–1	worm..	springs.	springs.	int-r-w.	int-r-w.	left..	cent..	Gramm–Bernstein.....
s&l-2*..	Westghs.	200.00*	cent..	motor..	Wauk'a..	1,000	10	Zenith..	grav.	seat..	cone..	ind-c.	amid...	4	11.75–1	worm..	springs.	springs.	int-r-w.	int-r-w.	left..	cent..	Gramm–Bernstein.....
.....	.....	.....	cent..	motor..	Pierce...	1,175	18	Stmbg..	grav.	seat..	dry-d..	selec.	unit-m.	3	7.00–1	worm..	springs.	springs.	int-r-w.	ext-r-w.	.....	cent..	Hahn.....C
.....	.....	.....	cent..	motor..	Pierce...	980	15	Stmbg..	grav.	seat..	dry-d..	selec.	unit-m.	3	7.00–1	worm..	rad-rd..	t-arm..	.....	.....	left..	cent..	Hahn.....E
lighting.	Bosch...	50.00	suct..	motor..	Mon'rch.	1,250	20	Zenith..	grav.	seat..	dry-d..	selec.	unit-m.	3	9.25–1	worm..	springs.	springs.	int-r-w.	int-r-w.	left..	cent..	Hall.....
lighting.	Bosch...	50.00	suct*	motor..	Mon*...	1,200	15	Zenith..	grav.	seat..	dry-d..	selec.	unit-m.	3	10.51–1	worm*	sp'gs*	sp'gs*	int-r-w.	int-r-w.	left..	cent..	Hall.....
lighting.	Bosch...	50.00	suct*	motor..	Mon*...	1,200	12	Zenith..	grav.	.....	dry-d..	selec.	unit-m.	4	12.00–1	dbl chn.	rad-rd..	.....	int-r-w.	ext-j. s.	left..	cent..	Hall.....
.....	.....	.....	cent..	motor..	own.....	1,025	12	Scheb..	grav.	seat..	cone..	selec.	unit-j..	3	9.43–1	dbl chn.	rad-rd..	.....	int-r-w.	ext-r-w.	right.	right.	Harrison.....C
.....	.....	.....	cent..	motor..	own.....	1,000	12	Stmbg..	grav.	seat..	cone..	selec.	unit-j..	3	9.60–1	dbl chn.	rad-rd..	.....	int.....	ext....	right.	cent..	Harrison.....F
s&l-2...	Westghs.	125.00	cent..	duplex..	Duplex..	1,000	14	Holley..	grav.	seat..	dry-p..	selec.	amid...	4	7.75–1	worm..	springs.	springs.	int-r-w.	int-r-w.	left..	cent..	Harvey.....W–F
s&l-2...	Westghs.	150.00	cent..	duplex..	Duplex..	1,000	13	Stmbg..	grav.	seat..	dry-p..	selec.	amid...	4	8.75–1	worm..	springs.	springs.	int-r-w.	int-r-w.	left..	cent..	Harvey.....W–H
s&l-2...	Westghs.	150.00	cent..	duplex..	Duplex..	900	11	Stmbg..	grav.	seat..	dry-p..	selec.	amid...	4	11.75–1	worm..	springs.	springs.	int-r-w.	int-r-w.	left..	cent..	Harvey.....W–K
.....	.....	.....	.....	.....	.....	1,700	.....	Master.	vac..	.....	dry-p..	selec.	unit-m.	3	.....	int-g...	springs.	springs.	int-r-w.	ext-r-w.	left..	cent..	Hawkeye.....H
.....	.....	.....	cent..	motor.	.....	.....	.....	.....	grav.	seat..	dry-d..	selec.	.....	3	.....	worm..	rad-rd..	.....	int-r-w.	int-r-w.	left..	cent..	Horner.....
.....	.....	.....	cent..	motor	.....	.....	.....	.....	grav.	seat..	dry-d..	selec.	.....	.....	.....	worm..	rad-rd..	springs.	int-r-w.	int-r-w.	left..	cent..	Horner.....

ABBREVIATIONS: (continued).—*Allis-Chalmers*; G & D, *Gray & Davis*; Westghs, *Westinghouse*; N-East, *Northeast*; Huff-S, *Huff-Simms*; Spl-App, *Splitdorf-Apple*. **Governor Type** cent, c't, *centrifugal*; suct, *suction or gas velocity*; l-b, *loose-ball*; hydr, *hydraulic*. **Governor Drive** motor, *from motor*; d-shft, *from driveshaft*; duplex, *from both motor and driveshaft or front wheel*; f-wheel, f-whl, *from front wheel*. **Governor Make** Wauk'a, *Waukesha*; Mon'rch, Mon, *Monarch*; Her-Sp, *Herschell-Spillman*; Milwkee, *Milwaukee*. **Carbureter Make,** Scheb, *Schebler*; Ray, *Rayfield*; Stmbg, *Stromberg*; Shkspr, *Shakespeare*; Flech, *Flechter*; Zen *Zenith*, Johns, *Johnson*. **Fuel Feed,** grav, *gravity*; vac, *vacuum*; pres, *pressure*. **Tank Location,** seat, *under seat*; dash, *in dash*; rear, *at rear*; r-bd, *on running-board*. **Clutch Type,** dry-d, *dry multiple disk*; dry-p, *dry plate:* wet-d, *multiple-disk in oil*; wet-p, *plate-in-oil*. **Gearset Type,** selec, *selective sliding gear*; prog, *progressive sliding gear*; ind-c, *individual clutch, constant-mesh*; plan, *planetary*; fric, *friction*; elec, *electric*. **Gearset Location,** amid, *amidships*; unit-m, *unit with motor*; unit-j, *unit with jackshaft*; unit-x, *unit with axle*. **Final Drive,** int-g, *internal-gear*; worm, *top worm*; dbl chn, *double side chains*; sp-bevel, *spiral bevel*; db-red, *double-reduction, bevel and spur gears*; ext-g, *external-gear*; -f, *to front wheels*; -4, *on all four wheels*. **Propulsion Taken By,** rad-rd, *radius rods*; tor-t, *torsion-tube*; sub-f, *sub-frame*; sp'gs, *springs*. **Brakes, Type,** ext, ex, *external contracting*; int, *internal expanding*. **Brake Location,** -r-w, *rear wheel*: -sht, *shaft*; -f-w, *front wheel*; -j-s, *jackshaft*; -4-w, *on all four wheels*. **Control, Levers,** cent, *center*; c & r, *gearshift center, brake right*; c & l, *gearshift center, brake left*.

Technical Specifications of Gasoline

Name and Model	Capacity in Pounds	Price of Chassis	Wheelbase in Inches	FRAME		TIRES			Wheels	MOTOR								
				Material	Construction	Kind	SIZES IN INCHES			No. of Crankshaft Bearings	Bore and Stroke	N.A.C.C. Hp.	Cylinders Cast	Valves Placed	COOLING		IGNITION		
							Front	Rear							Water Circulation	Radiator Core and Case	Type	Make	Spark Advance
Horner	6,000	$3,200	145	rolled-c.	rigid	sold	36x5	40x4d	wood-sq.	3	4-4½x5½	32.40	pairs	opp.	cent.	fin-cast	dual		hand
Horner	10,000	4,200	156	rolled-c.	rigid	soid	38x6	42x6d	wood-sq.	3	4-5¼x5½	44.20	pairs	opp.	cent.	fin-cast	dual		hand
Hurlburt	3,000	2,250	136*	pr-steel	rigid	solid	34x4	34x5	wood-ov.	3	4-3¾x5½	22.50	block	right	cent.	cell-sheet	sing.	Eisemann	fixed
Hurlburt	4,000	3,000	148*	pr-steel	rigid	solid	36x4	36x4d	wood-ov.	3	4-4¼x5½	27.20	block	right	cent.	fin-cast	dual	Eisemann	fixed
Hurlburt	7,000	3,500	146*	pr-steel	rigid	solid	36x5	36x5d	wood-ov.	3	4-4½x5½	29.00	block	right	cent.	fin-cast	dual	Eisemann	fixed
Hurlburt	10,000	4,250	156*	pr-steel		solid	36x5	38x6d	wood-ov.	4	6-3½x5½	33.75	block	right	cent.	fin-cast	dual	Eisemann	fixed
Hurlburt	14,000	5,000	156*	pr-steel		solid	36x6	40x7d	wood-ov.	4	6-3½x5½	33.75	block	right	cent.	fin-cast	dual	Eisemann	fixed
Independent F	2,000	1,385	128*	pr-steel		solid*	36x3*	36x4*	wood-sq.	3	4-3½x5	19.61	block		cent.	s-s-t-sheet	sing.	Eisemann	fixed
Independent G	4,000	1,850	144	pr-steel		solid	36x3½	36x5	wood-sq.	3	4-4¼x5½	27.20	block		cent.	s-s-t-cast	sing.	Eisemann	fixed
I.H.C. H	1,500	1,225	115	pr-steel	semi-flx	solid	36x3	36x3½	wood-ov.	3	4-3½x5½	19.61	block	right	cent.	fin-sheet	sing.	Bosch	hand
I.H.C. F	2,000	1,500	128*	pr-steel	semi-flx	solid	36x3½	36x4	wood-ov.	3	4-3½x5½	19.61	block	right	cent.	fin-sheet	sing.	Bosch	hand
Jeffery 1016	1,500	965	116	pr-steel	flexible	pneu	35x4½	35x4½	wood-ov.	3	4-3½x5½	22.50	block	right	cent.	cell-sheet	sing.	Dixie	hand
Jeffery 2016	3,000	1,465	130	pr-steel	flexible	p & s	34x4½	34x5	w'd-sq*	3	4-3½x5½	22.50	block	right	cent.	cell-sheet	sing.	Dixie	hand
Jeffery Quad 4016	4,000	2,850	124*	pr-steel	flexible	solid	36x5	36x5	cast-d	3	4-4¼x5½	29.00	block	right	cent.	cell-sheet	sing.	Dixie	hand
Kelly-Springfield K-31	3,000	2,000	144*	pr-steel	semi-flx	solid*	36x3½*	36x6*	wood-sq.	3	4-3¾x5½	22.50	block	right	cent.	cell-sheet	sing.	Eisemann	auto
Kelly-Springfield K-32	3,000	2,000	144*	pr-steel	semi-flx	solid*	36x3½*	36x6*	wood-sq.	3	4-3¾x5½	22.50	block	right	cent.	cell-sheet	sing.	Eisemann	auto
Kelly-Springfield K-36	5,000	2,750	144*	pr-steel	semi-flx	solid*	36x4*	36x4d*	wood-sq.	3	4-3¾x5½	22.50	block	right	cent.	cell-sheet	sing.	Eisemann	auto
Kelly-Springfield K-35	5,000	2,750	144*	pr-steel	semi-flx	solid*	36x4*	36x4d*	wood-sq.	3	4-3¾x5½	22.50	block	right	cent.	cell-sheet	sing.	Eisemann	auto
Kelly-Springfield K-40	7,000	3,400	150*	pr-steel	semi-flx	solid*	38x5*	38x5d*	wood-sq.	3	4-4¼x6½	32.40	pairs	opp	cent.	cell-sheet	sing.	Eisemann	auto
Kelly-Springfield K-45	8,000	3,600	150*	pr-steel	semi-flx	solid*	38x5*	40x6d*	wood-sq.	3	4-4¼x6½	32.40	pairs	opp	cent.	cell-sheet	sing.	Eisemann	auto
Kelly-Springfield K-50	10,000	4,250	150*	pr-steel	semi-flx	solid*	38x6*	40x6d*	wood-sq.	3	4-4¼x6½	32.40	pairs	opp	cent.	cell-sheet	sing.	Eisemann	auto
Kelly-Springfield K-60	12,000	4,500	150*	pr-steel	semi-flx	solid*	38x6*	40x7d*	w'd-sq*	3	4-4¼x6½	32.40	pairs	opp	cent.	cell-sheet	sing.	Eisemann	auto
King	7,000	2,600	120	rolled-c.	flexible	solid	36x5	36x5d	wood-sq.	3	4-4½x5½	32.40	pairs	left	cent.	s-s-t-sheet	dual-d	Bosch	2 pt-fix
Kisselkar	1,500	950	124	pr-steel	rigid	pneu	32x4	32x4	wood-sq.	3	4-3¾x5½	24.22	block	right	cent.	sq-t-sheet	sing.	Eisemann	hand
Kisselkar	2,000	1,250	132	pr-steel	rigid	solid*	34x3*	34x4*	wood-sq.	3	4-3½x5½	24.22	block	right	cent.	sq-t-sheet	sing.	Eisemann	hand
Kisselkar	4,000	1,875	144*	pr-steel	rigid	solid	34x3½	36x6	wood-sq.	3	4-4½x5½	29.00	block	right	cent.	sq-t-sheet	sing.	Eisemann	hand
Kisselkar	5,000	2,250	166	pr-steel	rigid	solid	34x4	36x4d	wood-sq.	3	4-4½x5½	29.00	block	right	cent.	sq-t-sheet	sing.	Eisemann	hand
Kisselkar	8,000	2,850	168	pr-steel	rigid	solid	36x5	36x5d	wood-sq.	3	4-4½x5½	29.00	block	right	cent.	sq-t-sheet	sing.	Eisemann	hand
Kisselkar	10,000	3,350	180	pr-steel	rigid	solid	36x6	36x6d	wood-sq.	3	4-4¼x5½	29.00	block	right	cent.	sq-t-sheet	sing.	Eisemann	hand
Kleiber AA	1,750	1,600	130*	rolled-c.	semi-flx	solid*	34x3*	34x5*	wood-ov.	3	4-3½x5	22.50	block	right	thermo.	s-s-t-sheet	dual	Bosch	hand
Kleiber A1	3,000	2,250	140*	rolled-c.	semi-flx	solid	36x3½	36x5*	wood-ov.	3	4-4¼x5½	27.20	block	left	cent.	s-s-t-sheet	dual	Bosch	hand
Kleiber A2	4,000	2,400	145*	rolled-c.	semi-flx	solid	36x3½*	36x6*	wood-sq.		4-4¼x5½	27.20	block	left	cent.	s-s-t-sheet	dual	Bosch	hand
Kleiber B	5,000	2,750	150*	rolled-c.	semi-flx	solid	36x4	36x4d	wood-sq.	3	4-4¼x5½	27.20	block	left	cent.	s-s-t-sheet	dual	Bosch	hand
Kleiber C	7,000	3,500	160*	rolled-c.	semi-flx	solid	36x5	36x5d	wood-sq.	3	4-4½x5½	32.40	pairs	left	cent.	s-s-t-sheet	dual	Bosch	hand
Kleiber D	10,000	4,500	170*	rolled-c.	semi-flx	solid	36x6	40x6d	wood-sq.	3	4-5½x5½	44.20	pairs	opp	cent.	s-s-t-sheet	dual	Bosch	hand
Knickerbocker A	7,000	3,500	128	rolled-c.	rigid	solid	35x5	35x5d	wood-sq.	3	4-4½x5½	32.40	pairs	left	cent.	sq-t-sheet	dual	Bosch	hand
Knickerbocker C	10,000	4,500	148*	rolled-c.	rigid	solid	36x6	36x6d	wood-sq.	3	4-4½x5½	32.40	pairs	left	cent.	sq-t-sheet	dual	Bosch	hand
Knox Tractor 35		4,500	108½	rolled-c.	rigid	solid	36x5	38x6d	cast-hol.	3	4-5x5½	40.00	pairs	head	cent.	cell-sheet	sing.	Eisemann	hand
Knox Tractor 36	6,000	5,000	108½	rolled-c.	rigid	solid*	36x4	38x6d*	cast-hol.	3	4-5x5½	40.00	pairs	head	cent.	cell-sheet	sing.	Eisemann	hand
Koehler K	2,000	895	129	rolled-c.	rigid	solid	34x3	34x3½	wood-sq.	3	4-3½x5	19.61	block	head	thermo.	fin-cast	sing.	Heinze	fixed
Krebs 40	3,000	2,050	146	pr-steel		solid	36x3½	36x5	wood-sq.	3	4-3¾x5½	22.50	block	left	cent.	tube-cast	sing.	Bosch	hand
Krebs 60	4,000	2,375	162	pr-steel	semi-flx	solid	36x4	36x4d*	wood-sq.	3	4-4¼x5½	27.20	block	left	cent.	tube-cast	sing.	Bosch	hand
Krebs 90	7,000	3,250	180	pr-steel	semi-flx	solid	36x5	36x5d	wood-sq.	3	4-4¼x5½	32.40	pairs	left	cent.	tube-cast	sing.	Bosch	hand
Lambert V2	2,000	1,700	144	rolled-c.	semi-flx	solid	36x3½	36x4	wood-sq.	5	4-4¼x5½	29.00	sing.	left	cent.	fin-sheet	sing*	Remy*	hand
Lane A	1,500	1,075	120	rolled-c.		solid*	34x3*	34x4*	wood-sq.	2	4-3½x5	16.92	block	left	thermo.	fin-cast	sing.	G & D	hand
Lange C	3,000	1,850	130*	rolled-c.	rigid	solid	36x3½	38x4	wood-ov.	3	4-3¾x5½	22.50	block	right	thermo.	sq-t-sheet	sing.	Bosch	hand
Lange B	5,000	2,450	136*	rolled-c.	rigid	solid	36x4	38x6	wood-ov.	3	4-4¼x5½	27.20	block	right	thermo.	sq-t-sheet	sing.	Bosch	hand
Larrabee	2,000	1,550	130	pr-steel	semi-flx	solid*	34x3*	34x4*	wood-sq.	3	4-3½x5	22.50	block	right	thermo.	sq-t-sheet	sing.	G & D*	hand
Larrabee	3,000	2,000	140*	pr-steel	flexible	solid	36x3½	36x5	wood-sq	3	4-4¼x5½	27.20	block	right	cent.	sq-t-cast	sing.	G & D*	hand
Larrabee	5,000	2,300	152*	pr-steel	flexible	solid	36x4	36x6	wood-sq	3	4-4¼x5½	27.20	block	right	cent.	sq-t-cast	sing.	G & D*	hand
Lawson 35	1,000		112	pr-steel		pneu	31x4	31x4	wood-ov.	3	4-3¾x4½	22.50	block	right	thermo.	cell-sheet	sing.	Dixie	hand
Lincoln L	2,000	975	122*	pr-steel	semi-flx	pneu	33x5	33x5	wood-ov.	3	4-3½x5	19.61	block	right	thermo.	tube-cast	sing.	Dixie	fixed
Lippard-Stewart MW	1,000	1,000	106	pr-steel	semi-flx	pneu	33x4	33x4	wood-ov.	2	4-3½x5	16.92	block	left	thermo.	sq-t-sheet	sing.	Berling	fixed
Lippard-Stewart W	1,500	1,600	125*	pr-steel	semi-flx	pneu	35x4½	35x4½	wood-ov.	3	4-3½x5½	22.50	block	left	cent.	sq-t-sheet	sing.	Eisemann	fixed
Lippard-Stewart H	2,000	2,000	145	pr-steel	semi-flx	solid	36x3	36x5	wood-ov.	3	4-3½x5½	22.50	block	left	cent.	sq-t-cast	sing.	Eisemann	fixed
Lippard-Stewart F	3,000	2,300	145*	pr-steel	flexible	solid	36x3½	36x3d	wood-ov.	3	4-4¼x5½	27.20	block	left	cent.	sq-t-cast	sing.	Eisemann	fixed
Lippard-Stewart G	4,000	2,600	158*	pr-steel	flexible	solid	36x4	36x4d	wood-ov.	3	4-4¼x5½	27.20	block	left	cent.	sq-t-cast	sing.	Eisemann	fixed
Little Giant 15	1,500	1,500	138	pr-steel	semi-flx	p. & s	34x4	34x3½	wood-sq.	3	4-3½x5	19.61	block	right	thermo.	cell-sheet	sing.	Eisemann	hand
Little Giant H	2,000	1,400	110	rolled-I	semi-flx	solid	36x3	36x3½	wood-sq.	3	4-3¼x5½	19.61	block	right	thermo.	s-s-t-sheet	sing.	Eisemann	hand
Little Giant H	3,000	1,500	110	rolled-c.	semi-flx	solid	36x3½	36x4	wood-sq.	3	4-3¼x5½	19.61	block	right	thermo.	s-s-t-sheet	sing.	Eisemann	hand
Little Giant 16	4,000	2,500	144	pr-steel	semi-flx	solid	36x4	36x6	wood-sq.	3	4-4¼x5½	27.20	block	left	cent.	cell-sheet	sing.	Eisemann	hand
Maccar L	3,000	2,100	150	pr-steel	rigid	solid	36x4	36x5	wood-sq.	3	4-4¼x5½	27.20	block	left	cent.	fin-sheet	sing.	Bosch	hand
Maccar H	5,000	2,600	162	pr-steel	rigid	solid	36x4	36x4d	wood-sq.	3	4-4½x5½	32.40	pairs	left	cent.	cell-sheet	sing.	Bosch	hand
Maccar M	7,000	3,250	174	pr-steel	rigid	solid	37x5	37x5d	wood-sq.	3	4-4½x5½	32.40	pairs	left	cent.	cell-sheet	sing.	Bosch	hand
Maccar U	11,000		186	pr-steel	rigid	solid	37x5	40x6d	wood-sq.		4-4½x5½	32.40	pairs	left	cent.	cell-sheet	sing.	Bosch	hand
Mack AB	2,000	2,000	144*	pr-steel	semi-flx	solid	36x4	36x3½d*	wood-sq.	3	4-4x5	25.60	pairs	right	cent.	cell-sheet	sing.	Splitdorf	hand
Mack AB	2,000	2,000	144*	pr-steel	semi-flx	solid	36x4	36x3½d*	wood-sq.	3	4-4x5	25.60	pairs	right	cent.	cell-sheet	sing.	Splitdorf	hand
Mack AB	3,000	2,350	162*	pr-steel	semi-flx	solid	36x4	36x3½d*	wood-sq.	3	4-4x5	25.60	pairs	right	cent.	cell-sheet	sing.	Splitdorf	hand
Mack AB	3,000	2,350	162*	pr-steel	semi-flx	solid	36x4	36x3½d*	wood-sq.	3	4-4x5	25.60	pairs	right	cent.	cell-sheet	sing.	Splitdorf	hand
Mack AB	4,000	2,700	162*	pr-steel	semi-flx	solid	36x4	36x4d	wood-sq.	3	4-4x5	25.60	pairs	right	cent.	cell-sheet	sing.	Splitdorf	hand
Mack AB	4,000	2,700	162*	pr-steel	semi-flx	solid	36x4	36x4d	wood-sq.	3	4-4x5	25.60	pairs	right	cent.	cell-sheet	sing.	Splitdorf	hand
Mack AC	7,000	3,400	156*	pr-steel	semi-flx	solid	36x5	40x5d	wood-sq.	3	4-5x6	40.00	pairs	right	cent.	ring-cast	dual	Bosch	hand

ABBREVIATIONS: General, *, *with other options;* opt, *optional;* **Price,** -c, *complete with body.* **Frame, Material,** pr-steel, *pressed steel;* rolled-c, *rolled steel, channel section;* rolled-I, *rolled steel, I section;* **Frame Construction,** semi-flx, *semi flexible.* **Tires, kind,** Pneu, *pneumatic;* cush, *cushion,* p & s, *pneumatic front, solid, rear;* s & st, *solid rubber front, steel in rear.* **Tire Sizes,** -d, *dual.* **Wheels,** pr-steel, *pressed steel;* -ov, *oval spokes;* -sq, *square spokes;* -d, *disk or web type;* -hol, *hollow spokes;* -cr, *cruciform spokes;* -x, *cross-shaped solid spokes.* **Cylinders cast,** sing, *singly or individually.* **Location of valves,** opp, *opposite, T-head motor;* r & h, *one valve at right, the other in head, L-head motor;* l & h, *one valve at left the other in head, L-head motor.* **Water circulation,** cent, *centrifugal pump;* thermo-, *thermo-syphon or natural circulation;* gear, *gear pump.* **Radiator Type,** fin, *individually finned tubes;* sq-t, *square-tubular, resembling cellular, sometimes known as flat-tubular;* z-z-t, *zig-zag tubular, resembling cellular,* cell, *cellular or honeycomb type;* tube, *plain tubes without fins;* ring, *tubes arranged in ring about blower fan.* **Radiator Case,** -sheet, *sheet metal;* -cast, *cast metal, built up.* **Ignition Type,** sing, *single;* doub, *double,* dual-d, *dual-double.* **Make of Magneto** (or other sparking device), Conn., *Connecticut;* storage, *storage battery;* Westghs, *Westinghouse;* G & D, *Gray & Davis;* At Kent, *Atwater Kent.* **Spark Advance,** auto, *automatic;* 2-pt-fix, *two-point fixed, battery circuit in retard, magneto in advance.* **Electric System Type,** s, l & i, *starting, lighting and ignition, combination unit;* s & l, *starting and lighting, combination unit;* s & l-2, *starting and lighting, two-unit;* l & i, *lighting and ignition, combination unit.* **Electric System, Make,** Splitdf, *Splitdorf;* Al-Chal,—**(Abbreviations Continued on Opposite Page.)**

Commercial Vehicles for 1917—Continued

MOTOR											TRANSMISSION								BRAKES		CONTROL		
ELECTRIC SYSTEM			GOVERNOR			SPEED		FUEL SYSTEM				GEARSET											
Type	Make	Extra Cost	Type	Drive	Make	Motor in r. p. m.	Truck in m. p. h.	Carbureter Make	Fuel Feed	Tank Location	Clutch Type	Type	Location	Sp'ds	Total Gear Reduction in High	Final Drive	Propulsion Taken By	Torque Taken By	Hand	Foot	Steer	Levers	Name and Model
.....	.....	.....	cent..	motor..	.....	.....	.....	.....	grav.	.....	dry-d..	selec.	.....	3	9.40–1	worm..	rad-rd..	springs.	int-r-w.	int-r-w.	left..	cent..	Horner.....
.....	.....	.....	cent.	motor..	.....	.....	.....	.....	grav.	seat..	dry-d..	selec.	amid...	3	13.42–1	worm..	rad-rd..	springs.	int-r-w.	int-r-w.	left..	cent..	Horner.....
lighting.	Vesta..	stock..	cent..	motor..	Pierce..	1,200	18	Flech..	grav.	seat..	dry-d..	selec.	unit-m.	3	7.75–1	worm..	springs.	springs.	int-r-w.	int-r-w.	left..	cent..	Hurlburt.....
lighting.	Vesta..	stock..	cent..	motor..	Pierce..	1,200	16	Flech..	grav.	seat..	cone..	selec.	amid...	3	8.67–1	worm..	rad-rd..	t-arm..	int-r-w.	ext-r-w.	left..	cent..	Hurlburt.....
lighting.	Vesta..	stock..	cent..	motor..	Pierce..	1,200	13	Flech..	grav.	seat..	cone..	selec.	amid...	3	8.67–1	worm..	rad-rd..	t-arm..	int.....	ext....	left..	cent..	Hurlburt.....
lighting.	Westghs.	stock..	cent..	motor..	Pierce..	1,200	12	Flech..	grav.	seat..	dry-d..	selec.	amid...	3	10.33–1	worm..	rad-rd..	t-arm..	int-r-w.	int-r-w.	left..	cent..	Hurlburt.....
lighting.	Westghs.	stock..	cent..	motor..	Pierce..	1,200	12	Flech..	grav.	seat..	dry-d..	selec.	amid...	4	11.33–1	worm..	rad-rd..	t-arm..	int-r-w.	ext-sht.	left..	cent..	Hurlburt.....
s, l & i..	Jesco..	100.00	suct..	motor..	Mon'rch.	1,350	.....	Marvel.	grav.	seat..	dry-d..	selec.	unit-m.	3	.....	worm..	springs.	springs.	int-r-w.	int-r-w.	left..	cent..	Independent.....F
.....	.....	.....	suct..	motor..	Mon'rch.	.....	.....	Marvel.	grav.	seat..	dry-d.	selec.	unit-m.	3	.....	worm..	springs.	springs.	int-r-w.	int-r-w.	left..	cent..	Independent.....G
s & l*..	N-East*.	125.00	cent..	motor..	own.....	1,275*	18*	Holley..	grav.	seat..	cone..	selec.	amid...	3	7.00–1	int-g...	springs.	springs.	int-r-w.	int-r-w.	left..	cent .	I.H.C.....H
s & l*..	N-East*.	125.00	cent..	motor..	own.....	1,300	17	Holley..	grav.	seat..	cone..	selec.	amid...	3	8.00–1	int-g...	springs.	springs.	int-r-w.	int-r-w.	left..	cent..	I.H.C.....F
s & l-2..	Bijur..	stock..	.....	.....	.....	1,750	40	Stmbg..	.....	.....	dry-p..	selec.	unit-m.	3	4.50–1	sp-bev..	springs.	springs.	ext-sht.	ext-r-w.	left..	cent..	Jeffery.....1016
s & l-2..	Bijur..	stock..	cent..	duplex..	Duplex..	1,500	16	Stmbg..	grav.	dash.	dry-p..	selec.	unit-m.	3	8.10–1	int-g...	springs.	springs.	ext-sht..	ext-r-w.	left..	cent.	Jeffery.....2016
s & l-2..	Bijur..	125.00	cent..	duplex..	Duplex..	1,500	14	Stmbg..	grav.	seat..	dry-p..	ind-c.	amid...	4	8.50–1	int-g-4.	springs.	springs.	ext-sht.	int-4-w.	left..	cent..	Jeffery Quad.....4016
s & l-2..	R & M*.	175.00	l-b..	motor..	own.....	1,200	15	Ray...	grav.	seat..	cone..	selec.	amid...	3	.....	dbl chn.	rad-rd..	.....	int-r-w.	int-r-w.	left..	cent..	Kelly–Springfield..K–31
s & l-2..	R & M*.	175.00	l-b..	motor..	own.....	1,200	15	Ray...	grav.	seat..	cone..	selec.	amid...	3	.....	worm..	rad-rd..	springs.	int-r-w.	int-r-w.	left..	cent..	Kelly–Springfield..K–32
s & l-2..	R & M*.	175.00	l-b..	motor..	own.....	1,200	11	Ray...	grav.	seat..	cone..	selec.	amid...	3	.....	worm..	rad-rd..	springs.	int-r-w.	int-r-w.	left..	cent..	Kelly–Springfield..K–36
s & l-2..	R & M*.	175.00	l-b..	motor..	own.....	1,200	11½	Ray...	grav.	seat..	cone..	selec.	amid...	3	.....	dbl chn	rad-rd..	.....	int-r-w.	int-r-w.	left..	cent..	Kelly–Springfield..K–35
s & l-2..	R & M*.	175.00	l-b..	motor..	own.....	1,100	12	Ray...	grav.	seat..	cone..	selec.	amid...	3	.....	dbl chn	rad-rd..	.....	int-r-w.	int-r-w.	left..	cent..	Kelly–Springfield..K–40
s & l-2..	R & M*.	175.00	l-b..	motor..	own.....	1,100	12	Ray...	grav.	seat..	cone..	selec.	amid...	3	.....	dbl chn	rad-rd..	.....	int-r-w.	int-r-w.	left..	cent..	Kelly–Springfield..K–45
s & l-2..	R & M*.	175.00	l-b..	motor..	own.....	1,100	10½	Ray...	grav.	seat..	cone..	selec.	amid...	3	.....	dbl chn.	rad-rd..	.....	int-r-w.	int-r-w.	left..	cent..	Kelly–Springfield..K–50
s & l-2..	R & M*.	175.00	l-b..	motor..	own.....	1,100	10½	Ray...	grav.	seat..	cone..	selec.	amid...	3	.....	dbl chn.	rad-rd..	.....	.....	.....	left..	cent..	Kelly–Springfield..K–60
.....	.....	.....	cent..	motor..	Pierce..	1,000	12	Scheb..	grav.	seat..	dry-d..	ind-c.	unit-j..	3	8.67–1	dbl chn.	rad-rd..	.....	int-r-w.	ext-j...	right.	right.	King.....
s & l-2*..	Remy..	150.00*	cent..	motor	Pierce..	1,200	25	Stmbg..	vac.	seat.	cone..	selec.	unit-m.	3	4.58–1	sp-bev..	springs.	springs.	ext-r-w.	ext-r-w.	left..	cent..	Kisselkar.....
s & l-2*..	Remy..	150.00	cent..	motor	Pierce..	1,280	20	Stmbg..	vac.	seat.	cone..	selec.	unit-m.	3	6.50–1	worm..	springs.	springs.	int-r-w.	int-r-w.	left..	cent..	Kisselkar.....
s & l-2*..	Remy..	150.00	cent..	motor	Pierce..	1,295	15	Stmbg..	vac.	seat.	dry-p..	selec.	unit-m.	4	9.25–1	worm..	springs.	springs.	int-r-w.	int-r-w.	left..	cent..	Kisselkar.....
s & l-2*..	Remy..	150.00	cent.	motor	Pierce..	1,060	13	Stmbg..	vac.	seat.	dry-p..	selec.	unit-m.	4	8.70–1	worm..	springs.	springs.	int-r-w.	int-r-w.	left..	cent..	Kisselkar.....
s & l-2*.	Remy..	150.00	cent.	motor	Pierce..	1,425	13	Stmbg..	vac.	seat.	dry-p..	selec.	amid...	4	11.75–1	worm..	springs.	springs.	int-r-w.	int-r-w.	left..	cent..	Kisselkar.....
.....	.....	.....	cent	motor	Pierce..	1,456	12	Stmbg..	vac.	seat.	dry-p.	selec.	amid...	4	13.00–1	worm..	springs.	springs.	int-r-w.	int-r-w.	left..	cent..	Kisselkar.....
lighting.	.....	opt....	cent..	motor	Pierce..	1,300	20	Scheb..	grav.	seat.	dry-p.	selec.	unit-m.	3	6.75–1	worm..	springs.	springs.	int	int.....	right.	cent .	Kleiber.....AA
lighting.	.....	opt....	cent..	motor	Pierce..	1,250	18	Scheb..	grav.	seat.	wet-d.	selec.	amid...	3	6.50–1	worm..	springs.	springs.	int	ext....	right.	cent..	Kleiber.....A1
lighting.	.....	opt....	cent..	motor	Pierce..	1,225	17	Scheb..	grav.	seat..	wet-d.	selec.	amid...	3	7.75–1	worm..	rad-rd .	springs.	int	ext....	right.	cent..	Kleiber.....A2
lighting.	.....	opt....	cent..	motor	Pierce..	1,200	16	Scheb..	grav.	.....	wet-d.	selec.	amid...	3	8.67–1	worm..	springs.	springs.	int	ext....	right.	cent..	Kleiber.....B
lighting.	.....	opt....	cent..	motor	Pierce..	1,150	14	Scheb..	grav.	seat..	wet-d.	selec.	amid...	3	8.75–1	worm..	springs.	springs.	int	int.....	right.	cent..	Kleiber.....C
lighting.	.....	opt....	cent..	motor	Pierce..	1,100	12	Scheb..	grav.	seat..	wet-d.	selec	amid...	4	8.75–1	worm..	springs.	springs.	int	int.....	right.	cent..	Kleiber.....D
lighting.	.....	stock..	cent..	motor	Pierce..	1,500	12	Stmbg..	grav.	seat..	cone..	selec.	unit-m.	3	3.50–1	dbl chn.	rad-rd..	.....	int-r-w.	ext-f-w.	left..	left..	Knickerbocker.....A
lighting.	.....	stock..	cent..	motor	Pierce..	1,500	10	Stmbg..	grav.	seat..	cone..	selec.	unit-m.	3	3.50–1	dbl chn.	rad-rd..	.....	int-r-w.	ext-f-w.	left..	left..	Knickerbocker.....C
s & l-2..	Bijur..	stock..	.....	.....	none.....	.....	.....	Zenith..	vac.	r-bd..	dry-p..	selec.	unit-j..	3	9.60–1	dbl chn.	rad-rd..	.....	int-r-w.	ext-j-s..	left..	cent..	Knox Tractor.....35
s & l-2..	Bijur..	stock..	.....	.....	none.....	.....	.....	Zenith	vac.	r-bd..	dry-p..	selec.	unit-j..	3	12.05–1	dbl chn.	rad-rd..	.....	int-r-w.	ext-j-s..	left..	cent..	Knox Tractor.....36
none....	.....	.....	opt..	opt....	opt.....	2,050	30	Zephyr.	grav.	seat..	dry-d..	selec.	unit-m.	3	7.00–1	int-g...	springs.	springs.	int-r-w.	ext-r-w.	right.	cent..	Koehler.....K
.....	.....	.....	cent.	motor	own.....	1,100	15	Zenith..	grav.	seat..	dry-d..	selec.	unit-m.	4	7.75–1	worm..	springs.	springs.	int-r-w.	int-r-w.	right.	cent..	Krebs.....40
.....	.....	.....	cent..	motor	own.....	1,110	14	Zenith..	grav.	seat..	dry-d..	selec.	amid...	4	8.50–1	worm..	springs.	springs.	int-r-w.	int-r-w.	right.	right.	Krebs.....60
.....	.....	.....	cent..	motor	own.....	1,160	12	Zenith..	grav.	seat..	dry-d..	selec.	amid...	4	10.33–1	worm..	rad-rd..	springs.	int-r-w.	int-r-w.	right.	right.	Krebs.....90
s, l & i..	.....	100.00	cent..	motor..	Pierce..	1,500	.....	Scheb..	grav.	seat..	none..	fric..	amid...	inf..	.....	dbl chn.	rad-rd..	.....	int.....	ext....	left*.	.....	Lambert.....V2
.....	G & D..	stock..	.....	.....	.....	.....	.....	Shkspr.	grav.	dash.	wet-d.	selec.	unit-m.	3	6.20–1	worm..	springs.	springs.	int-r-w.	int-r-w.	left..	cent..	Lane.....A
none....	.....	.....	cent..	motor..	Pierce..	1,250	18	Stmbg..	grav.	seat..	wet-d.	ind-c.	unit-j..	3	8.05–1	dbl chn.	rad-rd..	.....	int-r-w.	ext-sht.	left..	cent..	Lange.....C
none....	.....	.....	cent..	motor..	Pierce..	1,250	15	Stmbg..	grav.	seat..	wet-d.	ind-c.	unit-j..	3	9.21–1	dbl chn.	rad-rd..	.....	int-r-w.	ext-sht.	left..	cent..	Lange.....B
s, l & i.	G & D..	stock..	cent..	motor..	Pierce..	1,200	18½	Scheb..	grav.	seat..	dry-d..	selec.	unit-m.	3	6.50–1	worm..	springs.	springs.	int-r-w.	int-r-w.	left..	cent..	Larrabee.....
s, l & i-2.	G & D..	stock..	cent..	motor..	Pierce..	1,200	15	Scheb..	grav.	seat..	dry-d..	selec.	unit-m.	3	7.75–1	worm..	springs.	springs.	int-r-w.	ext-r-w.	left..	cent..	Larrabee.....
s, l & i-2.	G & D..	stock..	cent..	motor..	Pierce..	1,200	14	Scheb..	grav.	seat..	dry-d..	selec.	unit-m.	3	8.66–1	worm..	springs.	springs.	int-r-w.	ext-r-w.	left..	cent..	Larrabee.....
s & l-2	Splitdf..	opt.....	.....	.....	.....	.....	.....	Scheb..	grav.	seat..	wet-p.	selec.	unit-m.	3	4.30–1	bevel...	springs.	tor-t...	int.....	ext....	left..	cent..	Lawson.....35
s, l & i..	Delco...	100.00	suct..	motor..	Mon'rch.	1,500	20	Zenith..	vac.	.....	cone..	selec.	unit-m.	3	6.50–1	bevel...	.....	t-arm..	int-r-w.	ext-r-w.	left..	c & l..	Lincoln.....L
s & l-2	Remy..	stock..	.....	.....	none....	1,525	25	Zenith..	grav.	seat..	cone..	selec.	amid...	3	5.80–1	worm..	springs.	springs.	int-r-w.	int-r-w.	left..	cent..	Lippard–Stewart....MW
s & l	Dyneto..	135.00	.....	.....	none....	1,182	20	Zen*.	grav.	.....	cone..	selec.	amid...	3	6.00–1	worm..	springs.	springs.	int-r-w.	int-r-w.	left..	cent..	Lippard–Stewart.....W
s & l	Dyneto..	135.00	cent..	motor	Pierce..	1,134	18	Zenith..	grav.	seat..	cone..	selec.	amid...	3	6.75–1	worm..	springs.	springs.	int.....	ext.....	left..	cent..	Lippard–Stewart.....H
s & l	Dyneto..	135.00	cent..	motor..	Pierce..	1,300	18	Zen*.	grav.	seat..	cone..	selec.	amid...	3	7.75–1	worm..	springs.	springs.	int.....	int.....	left..	cent..	Lippard–Stewart.....F
s & l	Dyneto..	135.00	cent..	motor..	Pierce..	1,295	15	Zen*.	grav.	seat..	cone..	selec.	amid...	3	9.25–1	worm..	springs.	springs.	int.....	int.....	left..	cent..	Lippard–Stewart.....G
lighting.	.....	stock..	.....	.....	.....	.....	.....	Scheb..	grav.	seat..	dry-d..	selec.	unit-m.	3	6.00–1	worm..	springs.	springs.	int-r-w.	int-r-w.	right.	cent.	Little Giant.....15
.....	.....	.....	.....	.....	.....	.....	.....	Scheb..	grav.	.....	wet-d.	.....	unit-j..	3	6.88–1	dbl chn.	rad-rd..	.....	ext....	ext....	right.	cent..	Little Giant.....H
.....	.....	.....	.....	.....	.....	.....	.....	Scheb..	grav.	seat..	wet-d.	selec.	unit-j..	3	6.88–1	dbl chn.	rad-rd..	.....	ext-r-w.	ext-j-s..	right.	cent..	Little Giant.....H
.....	.....	.....	.....	.....	.....	.....	.....	Scheb..	grav.	seat..	dry-d..	selec.	unit-m.	3	7.75–1	worm..	springs.	springs.	int-r-w.	int-r-w.	right.	cent..	Little Giant.....16
none....	.....	.....	cent..	motor..	Pierce..	1,000	16	Stmbg..	grav.	seat..	dry-d..	selec.	unit-m.	3	6.75–1	worm..	rad-rd..	springs.	ext-r-w.	..r-w..	left..	cent..	Maccar.....L
none....	.....	.....	cent..	motor..	Pierce..	1,000	13½	Stmbg..	grav.	seat..	dry-d..	selec.	unit-m.	3	7.75–1	worm..	rad-rd..	springs.	int-r-w.	int-r-w.	left..	cent..	Maccar.....H
none....	.....	.....	cent..	motor..	Pierce..	1,000	10½	Stmbg..	grav.	seat..	dry-d..	selec.	unit-m.	3	10.20–1	worm..	rad-rd..	springs.	int-r-w.	int-r-w.	left..	cent..	Maccar.....M
none....	.....	.....	cent..	motor..	Pierce..	1,000	8½	Stmbg..	grav.	seat..	dry-d..	selec.	amid...	4	13.66–1	worm..	rad-rd..	springs.	int-r-w.	int-r-w.	left..	cent..	Maccar.....U
s & l-2..	Bosch...	250.00	cent..	motor..	own.....	1,160	19¾	Stmbg..	grav.	seat..	dry-d	selec.	unit-m.	3	6.29–1*	dbl chn.	rad-rd..	.....	int-r-w.	ext-sht.	left..	cent..	Mack.....AB
s & l-2..	Bosch...	250.00	cent..	motor..	own.....	1,160	17¾	Stmbg..	grav.	seat..	dry-d..	selec.	unit-m.	3	7.00–1*	worm..	springs.	springs.	int-r-w.	int-r-w.	left..	cent..	Mack.....AB
s & l-2..	Bosch...	250.00	cent..	motor..	own.....	1,160	16	Stmbg..	grav.	seat..	dry-d..	selec.	unit-m.	3	7.75–1*	worm..	springs.	springs.	int-r-w.	int-r-w.	left..	cent..	Mack.....AB
s & l-2..	Bosch...	250.00	cent..	motor..	own.....	1,160	17¾	Stmbg..	grav.	seat..	dry-d..	selec.	unit-m.	3	6.99–1*	dbl chn.	rad-rd..	.....	int-r-w.	ext-sht.	left..	cent..	Mack.....AB
s & l-2..	Bosch...	250.00	cent..	motor..	own.....	1,160	16	Stmbg..	grav.	seat..	dry-d..	selec.	unit-m.	3	7.75–1*	worm..	springs.	springs.	int-r-w.	int-r-w.	left..	cent..	Mack.....AB
s & l-2..	Bosch...	250.00	cent..	motor..	own.....	1,160	17¾	Stmbg..	grav.	seat..	dry-d..	selec.	unit-m.	3	6.99–1*	dbl chn.	rad-rd..	.....	int-r-w.	ext-sht.	left..	cent..	Mack.....AB
s & l-2..	Bosch...	250.00	cent..	motor..	own.....	1,000	15½	Stmbg..	grav.	seat.	dry-p..	selec.	unit-j..	3	7.54–1*	dbl chn.	rad-rd..	.....	int-r-w.	ext-j-s.	left.	cent..	Mack.....AC

ABBREVIATIONS: (continued).—*Allis-Chalmers*; G & D, *Gray & Davis*; Westghs, *Westinghouse*; N-East, *Northeast*; Huff-S, *Huff-Simms*; Spl-App, *Splitdorf-Apple*. **Governor Type** cent, c't, *centrifugal*; suct, *suction or gas velocity*; l-b, *loose-ball*; hydr, *hydraulic*. **Governor Drive** motor, *from motor*; d-shft, *from driveshaft*; duplex, *from both motor and driveshaft or front wheel*; f-wheel, f-whl, *from front wheel*. **Governor Make** Wauk'a, *Waukesha*; Mon'rch, Mon, *Monarch*; Her-Sp, *Herschell-Spillman*; Milwkee, *Milwaukee*. **Carbureter Make,** Scheb, *Schebler*; Ray, *Rayfield*; Stmbg, *Stromberg*; Shkspr, *Shakespeare*; Flech, *Flechter*; Zen, *Zenith*, Johns, *Johnson*. **Fuel Feed,** grav, *gravity*; vac, *vacuum*; pres, *pressure*. **Tank Location,** seat, *under seat*; dash, *in dash*; rear, *at rear*; r-bd, *on running-board*. **Clutch Type,** dry-d, *dry multiple disk*; dry-p, *dry plate:* wet-d, *multiple-disk in oil*; wet-p, *plate-in-oil*. **Gearset Type,** selec, *selective sliding gear*; prog, *progressive sliding gear*; ind-c, *individual clutch, constant-mesh*; plan, *planetary*; fric, *friction*; elec, *electric*. **Gearset Location,** amid, *amidships*; unit-m, *unit with motor*; unit-j, *unit with jackshaft*; unit-x, *unit with axle*. **Final Drive,** int-g, *internal-gear*; worm, *top worm*; dbl chn, *double side chains*; sp-bevel, *spiral bevel*; db-red, *double-reduction, bevel and spur gears*; ext-g, *external-gear*; -f, *to front wheels*; -4, *on all four wheels*. **Propulsion Taken By,** rad-rd, *radius rods*; tor-t, *torsion-tube*; sub-f, *sub-frame*; sp'gs, *springs*. **Torque Taken By,** rad-rd, *radius rods*; tor-t, *torsion-tube*; t-arm, *torque-arm*; sub-f, *sub-frame*; sp'gs, *springs*. **Brakes, Type,** ext, ex, *external contracting*; int, *internal expanding*. **Brake Location,** -r-w, *rear wheel*: -sht, *shaft*; -f-w, *front wheel*; -j-s, *jackshaft*; -4-w, *on all four wheels*. **Control, Levers,** cent, *center*; c & r, *gearshift center, brake right*; c & l, *gearshift center, brake left*.

Technical Specifications of Gasoline

Name and Model	Capacity in Pounds	Price of Chassis	Wheelbase in Inches	FRAME		TIRES			Wheels	MOTOR									
				Material	Construction	Kind	SIZES IN INCHES			No. of Crankshaft Bearings	Bore and Stroke	N.A.C.C. Hp.	Cylinders Cast	Valves Placed	COOLING		IGNITION		
							Front	Rear							Water Circulation	Radiator Core and Case	Type	Make	Spark Advance
Mack AC	11,000	$4,000	156*	pr-steel	semi-flx	solid	36x6-	40x6d	wood-sq	3	4-5x6	40.00	pairs	right	cent	ring-cast	dual	Bosch	hand
Mack AC	15,000	4,500	156*	pr-steel	semi-flx	solid	36x7	40x7d	wood-sq	3	4-5x6	40.00	pairs	right	cent	ring-cast	dual	Bosch	hand
Mack Tractor AC	14,000	3,400	119	pr-steel	semi-flx	solid	36x5	40x5d	wood-sq	3	4-5x6	40.00	pairs	right	cent	ring-cast	dual	Bosch	hand
Mack Tractor AC	22,000	4,000	119	pr-steel	semi-flx	solid	36x6	40x6d	wood-sq	3	4-5x6	40.00	pairs	right	cent	ring-cast	dual	Bosch	hand
Mack Tractor AC	30,000	4,500	119	pr-steel	semi-flx	solid	36x7	40x7d	wood-sq	3	4-5x6	40.00	pairs	right	cent	ring-cast	dual	Bosch	hand
Maxwell 25	500	535	103	pr-steel	flexible	pneu	30x3½	30x3½	wood-ov	2	4-3¼x4½	21.08	block	right	thermo	fin-sheet	dual	Simms	hand
Menominee EW	1,500	1,295	124	rolled-c	semi-flx	cush	36x4	37x5½	wood-ov	3	4-3¾x5	22.50	block	right	thermo	cell-sheet	sing	Bosch	hand
Menominee FW	2,000	1,575	130*	rolled-c	semi-flx	solid	36x3½	36x5	wood-sq	3	4-3¾x5½	22.50	block	left	cent	cell-sheet	sing	Bosch	hand
Menominee H	3,000	1,775	130*	rolled-c	semi-flx	solid	36x3½	36x5	wood-sq	3	4-3¾x5½	22.50	block	left	cent	cell-sheet	sing	Bosch	hand
Menominee D	4,000	2,240	144*	rolled-c	semi-flx	solid	36x4	36x6*	wood-sq	3	4-4 x5½	27.20	block	left	cent	cell-sheet	sing	Bosch	hand
Menominee G	7,000	2,775	160*	rolled-c	semi-flx	solid	36x5	36x5d	wood-sq	3	4-4½x5½	32.40	pairs	left	cent	fin-cast	sing	Bosch	hand
Mercury Bulley Trac A		3,400	71	rolled-c	rigid	solid	34x4	38x4d	wood-sq	3	4-4¼x5	29.00	pairs	opp	cent	cell-sheet	dual	Bosch	hand
Moreland 15-D	2,000	1,650	126	pr-steel	semi-flx	solid	34x3½	34x4	wood-sq	3	4-3¾x5	22.50	block	right	thermo	cell-cast	sing	Dixie	hand
Moreland 15-B	3,000	1,950	126*	pr-steel	semi-flx	solid	34x3½	34x5	wood-sq	3	4-4 x5½	27.20	block	right	cent	cell-sheet	sing	Dixie	hand
Moreland 15-C	5,000	2,550	144*	pr-steel	semi-flx	solid	34x4	34x4d	wood-sq	3	4-4½x5½	32.40	pairs	right	cent	cell-sheet	sing	Dixie	hand
Moreland 15-G	8,000	3,400	162*	pr-steel	semi-flx	solid	36x5	38x5d	wood-sq	3	4-4¾x6¼	36.15	pairs	right	cent	cell-sheet	dual	Dixie	hand
Moreland 16-J	10,000	3,800	180*	pr-steel	semi-flx	solid	36x6	40x6d	wood-sq	3	4-4¾x6¼	36.15	pairs	right	cent	cell-sheet	dual	Dixie	hand
Moon B	3,000	1,600	140*	pr-steel	rigid	solid	36x3½	36x4*	wood-ov	3	4-3¾x5½	22.50	block	head	gear	s-z-t-sheet	dual	Remy*	
Nelson & LeMoon E1	2,000	1,700	opt			solid	36x3	36x4		3	4-3¾x5½	22.50	block	left	cent	sq-t-sheet	sing	Bosch	
Nelson & LeMoon E2	4,000	2,250	opt			solid	36x4	36x7		3	4-4 x5½	27.20	block	left	cent	sq-t-sheet	dual	Bosch	
Nelson & LeMoon E3	6,000	2,950	opt			solid	36x5	38x5d		3	4-4½x5½	32.40	pairs	left	cent	sq-t-sheet	dual	Bosch	auto
Netco D	4,000	2,350	144*	pr-steel	rigid	solid	36x4	36x6	wood-sq	3	4-4¼x5½	27.20	block	left	cent	fin-t-cast	sing	Eisemann	fixed
Netco E	4,000	2,600	144*	pr-steel	semi-flx	solid	36x4	36x6	wood-sq	3	6-3¾x5½	33.75	threes	right	cent	fin-t-cast	dual	G & D	hand
New York M	3,000	2,200	144*	rolled-c	semi-flx	solid	36x3½	36x5	wood-sq	3	4-4¼x5½	27.20	block	left	cent	sq-t-sheet	sing	Bosch	fixed
Niles B	2,000	1,175	124	pr-steel	flexible	pneu	35x5	35x5	wood-ov	3	4-3¼x5	19.61	block	left	thermo	sq-t-sheet	sing	Eisemann	hand
Niles E	4,000	1,875	140*	pr-steel	flexible	solid	36x4	36x7	wood-ov	3	4-4¼x5½	27.20	block	left	cent	z-s-t-sheet	sing	Eisemann	hand
Old Hickory	1,250	825	112	rolled-c	semi-flx	pneu	33x4	33x4	wood-ov		4-3¼x5	16.92	block	right	thermo	cell-sheet	sing	Conn	hand
Old Reliable	3,000	1,950	150*	pr-steel	semi-flx	solid	34x3	36x6	wood-sq	3	4-3¾x5	22.50	block	left	cent	sq-t-sheet	sing	Bosch	hand
Old Reliable	4,000	2,450	150	rolled-c	semi-flx	solid	34x4	36x4d	wood-sq	4	4-4x6	25.60	block	left	cent	sq-t-sheet	sing	Bosch	hand
Old Reliable	5,000	2,750		rolled-c	rigid	solid	34x4	36x4d	wood-sq	3	4-4½x5	29.00	pairs	opp	cent	sq-t-sheet	sing	Bosch	hand
Old Reliable	6,000	3,250	150	rolled-c	semi-flx	solid	34x5	36x5d	wood-sq	4	4-4½x6	29.00	block	left	cent	sq-t-sheet	sing	Bosch	hand
Old Reliable	8,000	3,750		rolled-c	semi-flx	solid	36x5	40x5d	wood-sq	3	4-4½x5½	36.15	pairs	opp	cent	sq-t-sheet	sing	Bosch	hand
Old Reliable	8,000	3,750		rolled-c		solid	36x6	36x6d	wood-sq	3	4-4½x5½	36.15	pairs	opp	cent	sq-t-sheet	sing	Bosch	hand
Old Reliable	10,000	4,500	150*	rolled-c	rigid	solid	36x6	36x6d	wood-sq	3	4-4½x5½	36.15	pairs	opp	cent	sq-t-sheet	sing	Bosch	hand
Old Reliable	14,000	5,000	150	rolled-c	rigid	solid	36x6	40x7d	wood-sq	3	4-5 7/16x5½	41.62	pairs	opp	cent	sq-t-sheet	sing	Bosch	hand
Overland 75-B	800	625-c	104	pr-steel		pneu	31x4	31x4	wood-ov	2	4-3¼x5	18.21	block	right	thermo	cell-sheet		storage	hand
Overland	1,200	725	106	pr-steel		pneu	33x4½	33x4½	wood-ov	5	4-4¼x4½	27.20	block	right	thermo	cell-sheet		Dixie	hand
Packard 1-D	2,000	2,200	126*	rolled-c		solid	34x3½	34x6	wood-sq	3	4-4x5½	25.60	block	right	cent	cell-sheet	dual	Dixie	hand
Packard 1½-D	3,000	2,500	126*	rolled-c		solid	34x3½	34x3½d	wood-sq	3	4-4x5½	25.60	block	right	cent	cell-sheet	dual	Dixie	hand
Packard 2-D	4,000	2,800	144*	rolled-c		solid	34x4	34x4d	wood-sq	3	4-4x5½	25.60	block	right	cent	cell-sheet	dual	Dixie	hand
Packard 3-D	6,000	3,400	156*	rolled-c		solid	36x5	36x5d	wood-sq	3	4-4¼x5½	32.40	block	right	cent	cell-sheet	dual	Dixie	hand
Packard 4-D	8,000	3,800	156*	rolled-c		solid	36x5	40x5d	wood-sq	3	4-4¼x5½	32.40	block	right	cent	cell-sheet	dual	Dixie	hand
Packet	600	350	100	pr-steel	rigid	pneu	28x3	28x3	wood-ov	2	4-2¼x4	12.08	block	right	thermo	fin-sheet	sing	At Kent	auto
Palmer	2,000	1,350	132½	pr-steel	rigid	solid	34x3½	34x4	wood-sq	3	4-3¾x5	22.50	block	right	thermo	sq-t-cast	sing	Bosch	fixed
Palmer	4,000	1,975	144	pr-steel	rigid	solid	36x3½	36x3½d	wood-sq	3	4-4¼x5½	27.20	block	left	cent	sq-t-cast	sing	Bosch	fixed
Palmer-Moore K	1,500	1,150	106	pr-steel	rigid	solid	36x3	36x3½	wood-ov	3	4-3½x5½	19.61	block	right	thermo	fin-cast	sing	Bosch	auto
Palmer-Moore M	2,000	1,350	126	pr-steel	rigid	solid	36x3½	36x4	wood-sq	3	4-3¾x5½	22.50	block	right	thermo	fin-cast	sing	Bosch	auto
Peerless TC2	4,000		145			solid	36x4	36x4d		3	4-4½x6½	32.40	pairs	opp	gear	fin-sheet	dual	Remy	hand
Peerless TC3	6,000		151*			solid	36x4	40x4d		3	4-4½x6½	32.40	pairs	opp	gear	fin-sheet	dual	Remy	hand
Peerless TC4	8,000		151*			solid	36x5	40x5d		3	4-4½x6½	32.40	pairs	opp	gear	fin-sheet	dual	Remy	hand
Peerless TC5	10,000		151*			solid	38x6	42x6d		3	4-4½x6½	32.40	pairs	opp	gear	fin-sheet	dual	Remy	hand
Peerless TC6	12,000		151*			solid	38x7	42x7d		3	4-4½x6½	32.40	pairs	opp	gear	fin-sheet	dual	Remy	hand
Pennsy 15	1,000	660	98	pr-steel		pneu	30x3½	31x4	wood-ov	2	4-4¼x4½	27.20	block	right	thermo	fin-sheet	sing	Dixie	fixed
Pierce-Arrow	4,000	3,000	150*	pr-steel	flexible	solid	36x4	36x4d	wood-ov	3	4-4x5½	25.60	pairs	opp	cent	fin-cast	sing	Eisemann*	hand
Pierce-Arrow	10,000	4,500	168*	pr-steel	flexible	solid	36x5	40x6d	wood-ov	3	4-4¼x6	38.25	pairs	opp	cent	fin-cast	dual	Bosch*	hand
Pullman 4-24	1,000		114	pr-steel	semi-flx	pneu	31x4	31x4	wood-ov	3	4-3¾x4½	22.50	block	left	thermo	cell-sheet	sing	Dixie	hand
Rainier	1,000	850	115	pr-steel	rigid	pneu	33x4	33x4	wood-sq	2	4-3½x4½	16.92	block	left	thermo	fin-sheet	sing	Dixie	hand
Reo F	1,500	1,000	120	pr-steel	rigid	pneu	34x4½	34x4½	wood-ov	3	4-4¼x4½	27.20	pairs	r&h	cent	fin-sheet	sing	Remy	hand
Reo J	4,000	1,650	146	pr-steel	rigid	solid	36x4	36x3½d	wood-sq	3	4-4¼x4½	27.20	pairs	r&h	cent	fin-cast	dual	National	hand
Republic 9	1,500	750	120	pr-steel	flexible	cush	32x3	32x3½	wood-sq	2	4-3¼x5	16.92	block	left	thermo	sq-t-cast	sing	Bosch	fixed
Republic 10	2,000		124	pr-steel	semi-flx	solid	34x3	34x4	wood-sq	3	4-3½x5	19.61	block	left	thermo	cell-cast	sing	Bosch	fixed
Republic 11	3,000		144	pr-steel	semi-flx	solid	34x3	34x5	wood-sq	3	4-3¾x5	22.50	block	left	thermo	cell cast	sing	Bosch	fixed
Republic 12	4,000		144*	pr-steel	semi-flx	solid	34x4	34x6	wood-sq	3	4-4¼x5½	27.20	block	left	cent	cell-cast	sing	Bosch	fixed
Republic T	6,000		165*	pr-steel	semi-flx	solid	36x5	36x5d	cast-d	3	4-4¼x5½	29.00	block	left	cent	cell-cast	sing	Bosch	hand
Riker	6,000	3,500	150*	pr-steel	rigid	solid	36x5	36x5d	wood-sq	5	4-4½x6	29.00	pairs	opp	cent	fin-cast	dual	Bosch	hand
Riker	8,000	3,650	150*	pr-steel	rigid	solid	36x5	36x6d	wood-sq	5	4-4½x6	29.00	pairs	opp	cent	fin-cast	dual	Bosch	hand
Royal	2,000		124*	rolled-c		solid	34x4	34x5	wood-sq	3	4-3½x5	16.92	block	left	cent	cell-cast	sing	Bosch	fixed
Royal	5,000		132*	rolled-c		solid	36x4½	36x6	wood-sq	3	4-4x6	25.60	block	left	cent	cell-cast	sing	Bosch	fixed
Royal	7,000		158*	rolled-c		solid	36x5	38x5d	wood-ov	3	4-4½x6	29.00	block	left	cent	cell-cast	sing	Bosch	fixed

ABBREVIATIONS: General, *, *with other options;* opt, *optional;* **Price,** -c, *complete with body.* **Frame, Material,** pr-steel, *pressed steel;* rolled-c, *rolled steel, channel section;* rolled-I, *rolled steel, I section;* **Frame Construction,** semi-flx, *semi flexible.* **Tires, kind,** Pneu, *pneumatic;* cush, *cushion,* p & s, *pneumatic front, solid, rear;* s & st, *solid rubber front, steel in rear.* **Tire Sizes,** -d, *dual.* **Wheels,** pr-steel, *pressed steel;* -ov, *oval spokes;* -sq, *square spokes;* -d, *disk or web type;* -hol, *hollow spokes;* -cr, *cruciform spokes;* -x, *cross-shaped solid spokes.* **Cylinders cast,** sing, *singly or individually.* **Location of valves,** opp, *opposite, T-head motor;* r & h, *one valve at right, the other in head, L-head motor;* l & h, *one valve at left the other in head, L-head motor.* **Water circulation,** cent, *centrifugal pump;* thermo-, *thermo-syphon or natural circulation;* gear, *gear pump.* **Radiator Type,** fin, *individually finned tubes;* sq-t, *square-tubular, resembling cellular, sometimes known as flat-tubular;* z-s-t, *zig-zag tubular, resembling cellular,* cell, *cellular or honeycomb type;* tube, *plain tubes without fins;* ring, *tubes arranged in ring about blower fan.* **Radiator Case,** -sheet, *sheet metal;* -cast, *cast metal, built up.* **Ignition Type,** sing, *single;* doub, *double,* dual-d, *dual-double.* **Make of Magneto** (or other sparking device), Conn., *Connecticut;* storage, *storage battery;* Westghs, *Westinghouse;* G & D, *Gray & Davis;* At Kent, *Atwater Kent.* **Spark Advance,** auto, *automatic;* 2-pt-fix, *two-point fixed, battery circuit in retard, magneto in advance.* **Electric System Type,** s, l & i, *starting, lighting and ignition, combination unit;* s & l, *starting and lighting, combination unit;* s & l-2, *starting and lighting, two-unit;* l & i, *lighting and ignition, combination unit.* **Electric System, Make,** Splitdf, *Splitdorf;* Al-Chal,—(Abbreviations Continued on Opposite Page.)

Commercial Vehicles for 1917—Continued

MOTOR										TRANSMISSION								BRAKES		CONTROL		
ELECTRIC SYSTEM			GOVERNOR			SPEED		FUEL SYSTEM			GEARSET			Total Gear Reduction in High	Final Drive	Propulsion Taken By	Torque Taken By					Name and Model
Type	Make	Extra Cost	Type	Drive	Make	Motor in r. p.m.	Truck in m.p.h.	Carbureter Make	Fuel Feed	Tank Location	Clutch Type	Type	Location	Sp'ds				Hand	Foot	Steer	Levers	
s&l-2...	Bosch...	250.00	cent..	motor..	own....	1,000	14½	Stmbg..	grav.	seat..	dry-p..	selec.	unit-j..	3	8.40–1*	dbl chn.	rad-rd..	.....	int-r-w.	ext-j-s.	left..	cent..	Mack.....AC
s&l-2...	Bosch...	250.00	cent	motor..	own....	1,000	10½	Stmbg	grav.	seat..	dry-p..	selec.	unit-j..	3	11.58–1*	dbl chn.	rad-rd..	.....	int-r-w.	ext-j-s	left..	cent..	Mack.....AC
s&l-2	Bosch...	250.00	cent..	motor..	own....	1,000	9	Stmbg..	grav.	seat..	dry-p	selec.	unit-j..	3	12.42–1*	dbl chn.	rad-rd..	.....	int-r-w.	ext-j-s.	left..	cent..	Mack Tractor.....AC
s&l-2...	Bosch...	250.00	cent..	motor..	own....	1,000	10½	Stmbg..	grav.	seat..	dry-p..	selec.	unit-j..	3	11.58–1*	dbl chn.	rad-rd..	.....	int-r-w.	ext-j-s..	left..	cent..	Mack Tractor.....AC
s&l-2..	Bosch...	250.00	cent	motor..	own....	1,000	8½	Stmbg	grav.	seat..	dry-p..	selec.	unit-j..	3	14.10–1*	dbl chn.	rad-rd..	.....	int-r-w.	ext-j-s.	left..	cent..	Mack Tractor.....AC
s&l....	Huff-S..	stock..	none	.....	.....	.....	.....	K.D ..	grav.	dash.	cone..	selec.	unit-m.	3	3.59–1	bevel...	springs.	tor-t...	int-r-w.	ext-r-w.	left..	cent..	Maxwell.....25
none....	.....	.....	cent	d-shaft	own....	900	25	Stmbg	grav.	seat..	dry-d..	selec.	unit-m.	3	.....	worm..	rad-r...	springs.	int-r-w.	int-r-w.	left..	cent..	Menominee.....EW
none....	.....	.....	cent	d-shaft	own....	850	16	Stmbg	grav.	seat..	dry-d..	selec.	unit-m.	3	.....	worm..	rad-r...	springs.	int-r-w.	int-r-w.	left..	cent..	Menominee.....FW
none....	.....	.....	cent	d-shaft	own....	800	15	Stmbg..	grav.	seat..	dry-d..	selec.	unit-m.	3	.....	worm..	rad-r...	springs.	int-r-w.	int-r-w.	left..	cent..	Menominee.....H
none....	.....	.....	cent..	d-shaft	own....	750	14	Stmbg..	grav.	seat..	dry-d..	selec.	unit-m.	3	.....	worm..	rad-r...	springs.	int-r-w.	int-r-w.	left..	cent..	Menominee.....D
none....	.....	.....	.....	.....	own....	750	12	Stmbg..	grav.	seat..	.....	.....	amid...	3	.....	worm..	rad-rd..	springs.	int-r-w.	int-r-w.	left..	cent..	Menominee.....G
lighting.	Bosch...	stock..	cent..	motor..	Pierce...	800	12	Stmbg..	grav.	seat..	dry-p..	ind-c.	unit-j..	3	14.00–1	dbl chn.	rad-rd..	.....	ext-j-s..	int-r-w.	right.	right.	Mercury-Bulley Trac..A
lighting.	Westghs.	75.00	cent..	motor..	Pierce...	1,075	18	Ensign.	grav.	seat..	dry-d..	selec.	unit-m.	3	6.00–1	worm..	springs.	springs.	int-r-w.	ext-r-w.	right.	cent..	Moreland.....15-D
lighting.	Westghs.	75.00	cent..	motor..	Pierce...	1,200	18	Ensign.	grav.	seat..	dry-d..	selec.	unit-m.	3	6.75–1	worm..	rad-rd..	springs.	int-r-w.	int-r-w.	right.	cent.	Moreland.....15-B
lighting.	Westghs.	75.00	cent..	motor..	Pierce...	1,100	15	Ensign.	grav.	seat..	dry-d..	selec.	unit-m.	4	7.00–1	worm..	rad-rd..	springs.	int-r-w.	int-r-w.	right.	cent.	Moreland.....15-C
lighting.	Westghs.	75.00	cent..	motor..	Pierce...	890	12½	Ensign.	grav.	seat..	dry-d.	selec.	amid...	4	7.80–1	worm..	rad-rd..	springs.	int-r-w.	int-r-w.	right.	cent	Moreland.....15-G
lighting.	Westghs.	75.00	cent..	motor..	Pierce...	890	9	Ensign.	.....	.....	dry-d.	selec.	amid...	4	11.67–1	worm..	rad-rd..	springs.	int-r-w.	int-r-w.	right.	cent	Moreland.....16-J
none....	.....	.....	.....	.....	none....	1,800	18	Stmbg..	grav.	seat.	cone..	selec.	unit-j..	3	.....	dbl chn.	rad-rd..	.....	int-r-w.	int-r-w.	left..	l & c..	Moon.....B
.....	.....	.....	suct.	motor.	Mon'rch.	1,000	16	Ray.....	.....	.....	dry-d..	selec.	unit-m.	3	6.75–1	worm..	.....	.....	.....	.....	right.	cent..	Nelson & LeMoon...E1
.....	.....	.....	suct.	motor.	Mon'rch.	1,000	14	Ray.....	.....	.....	dry d..	selec.	unit-m.	3	8.75–1	worm..	.....	.....	.....	.....	right.	cent..	Nelson & LeMoon...E2
.....	.....	.....	suct.	motor.	Mon'rch.	1,000	12	Ray.....	.....	.....	dry-d..	selec.	unit-m.	3	8.75–1	worm..	.....	.....	.....	.....	right.	cent..	Nelson & LeMoon...E3
s,l&i...	G & D..	200.00	.....	.....	none....	1,800	15	Zenith..	grav.	seat..	dry-d..	selec.	unit-m.	3	8.50–1	worm..	springs.	springs.	int-r-w.	int-r-w.	left..	cent..	Netco.....D
s,l&i...	G & D..	200.00	.....	.....	none....	.....	.....	Zenith..	grav.	seat..	dry-d..	prog.	unit-m.	3	8.50–1	worm..	springs.	springs.	int-r-w.	int-r-w.	left..	cent..	Netco.....E
.....	.....	....'..	'cent.	.motor.	.Pierce.	.1,400	18	Stmbg..	grav.	seat.	dry-p..	ind-c.	unit-m.	3	7.75–1	worm..	rad-rd..	springs.	int-r-w.	int-r-w.	left..	cent..	New York.....M
opt.....	.....	.....	cent..	motor.	Pierce...	1,573	25	Stmbg..	grav.	seat..	dry-d..	selec.	unit-m.	3	6.50–1	worm..	springs.	springs.	int-r-w.	int-r-w.	left..	cent..	Niles.....B
opt.....	.....	.....	cent..	motor.	Pierce...	1,173	15	Stmbg..	grav.	seat..	dry-p..	selec.	amid...	3	8.50–1	worm..	rad-rd..	springs.	int-r-w.	int-r-w.	left..	cent..	Niles.....E
s&l-2...	Dyneto.	stock..	.....	.....	.....	960	16	Carter..	grav.	seat..	cone..	selec.	unit-m.	3	6.00–1	bevel...	tor-t...	tor-t...	int-r-w.	ext-r-w.	left..	cent..	Old Hickory.....
lighting.	.....	stock..	.....	.....	.....	.....	.....	Stmbg..	grav.	dash.	dry-d..	selec.	unit-m.	3	7.75–1	worm..	springs.	springs.	int-r-w.	int-r-w.	right.	r & c.	Old Reliable.....
lighting.	.....	stock..	cent..	duplex..	Duplex..	.....	.....	Stmbg..	grav.	dash.	dry-d..	selec.	unit-m.	3	7.75–1	worm..	springs.	springs.	int-r-w.	int-r-w.	right.	cent..	Old Reliable.....
.....	.....	.....	.....	.....	.....	.....	.....	Stmbg..	grav.	seat..	wet-d..	selec.	unit-j..	3	.....	dbl chn.	rad-rd..	.....	int-r-w.	ext-j-s..	right.	right.	Old Reliable.....
lighting.	.....	stock..	cent..	duplex..	Duplex..	.....	.....	Stmbg..	vac.	.....	dry-d..	selec.	unit-m.	3	8.75–1	worm..	springs.	springs.	int-r-w.	int-r-w.	right.	cent..	Old Reliable.....
lighting.	.....	stock..	cent..	duplex..	Duplex..	.....	.....	Stmbg..	vac.	.....	dry-d..	selec.	amid...	4	8.75–1	worm..	springs.	springs.	int-r-w.	int-r-w.	right.	cent..	Old Reliable.....
lighting.	.....	stock..	.....	.....	.....	.....	.....	Stmbg..	grav.	seat.	wet-d.	selec.	amid...	3	.....	dbl chn.	rad-rd..	.....	ext....	int....	right.	right.	Old Reliable.....
lighting.	.....	stock..	cent..	duplex..	Duplex..	.....	.....	Stmbg..	grav.	seat.	wet-d.	selec.	amid...	3	.....	dbl chn.	rad-rd..	.....	ext-r-w.	int-j-s.	right.	right.	Old Reliable.....
lighting.	.....	stock..	cent..	duplex..	Duplex..	.....	.....	Stmbg..	grav.	.....	wet-d.	selec.	unit-j..	4	.....	dbl chn.	rad-rd..	.....	int-r-w.	ext-j-s..	right.	right.	Old Reliable.....
s,l&i-2.	.....	stock..	.....	.....	none....	.....	.....	.....	.....	grav.	dash.	cone..	selec.	unit-x..	3	.....	bevel..	tor-t...	tor-t...	ext-r-w.	ext-r-w.	left..	cent..	Overland.....75-B
s,l&i-2.	.....	stock..	.....	.....	none....	.....	.....	.....	.....	grav.	seat.	cone..	selec.	unit-x..	3	.....	bevel..	tor-t...	tor-t...	ext-r-w.	ext-r-w.	left..	cent..	Overland.....
s&l-2...	Bijur....	180.00	cent..	motor.	own....	1,000	16	own....	pres.	seat..	dry-d..	prog.	amid...	3	6.25–1	worm..	rad-rd..	t-arm..	int-r-w.	ext-sht.	left..	left..	Packard.....1-D
s&l-2...	Bijur....	180.00	cent..	motor.	own....	1,000	16	own....	pres.	seat.	dry-d..	prog.	amid...	3	6.25–1	worm..	rad-rd..	t-arm..	int-r-w.	ext-sht.	left..	left..	Packard.....1½-D
s&l-2...	Bijur....	180.00	cent..	motor.	own....	1,000	14	own....	pres.	seat.	dry-d..	prog.	amid...	3	7.25–1	worm..	rad-rd..	t-arm..	int-r-w.	ext-sht.	left..	left..	Packard.....2-D
s&l-2...	Bijur....	180.00	hydr.	motor.	own....	1,000	12	own....	pres.	seat.	dry-d..	prog.	amid...	3	9.00–1	worm..	rad-rd..	t-arm..	int-r-w.	ext-sht.	left..	left..	Packard.....3-D
s&l-2.	Bijur....	180.00	hydr.	motor.	own....	1,000	12	own....	pres.	seat.	dry-d..	prog.	amid...	3	10.00–1	worm..	rad-rd..	t-arm..	int-r-w.	ext-sht.	left..	left..	Packard.....4-D
none....	.....	.....	.....	.....	none....	1,500	29	Carter..	grav.	dash.	none..	frict	unit-j..	3	4.25–1	dbl chn	rad-rd..	.....	int-r-w.	int-r-w.	left..	left..	Packet.....
none....	.....	.....	.....	.....	none....	.....	18	Stmbg..	grav.	seat..	dry-d.	selec.	unit-m.	3	.....	int-g...	springs.	springs.	int-r-w.	ext-r-w.	left..	cent	Palmer.....
none....	.....	.....	cent..	motor.	Pierce...	1,000	15	Stmbg.	grav.	seat..	dry-d..	selec.	unit-m.	3	7.75–1	worm..	rad-rd..	springs.	int-r-w.	int-r-w.	left..	cent..	Palmer.....
s&l*...	opt.....	.....	suct.	motor.	Mon'rch.	1,275	20	Zenith..	grav.	seat..	dry-d..	selec.	amid...	3	6.83–1	int-g...	springs	t-arm..	int-r-w.	ext-r-w.	left..	cent..	Palmer-Moore.....K
s&l*...	opt.....	.....	suct.	motor.	Mon'rch.	1,150	18	Zenith..	grav.	seat..	dry-d..	selec.	amid...	3	6.83–1	int-g...	springs.	t-arm..	int-r-w.	ext-r-w.	left..	cent..	Palmer-Moore.....M
.....	.....	.....	cent.	motor.	.....	.....	.....	Stmbg.	.....	.....	cone..	selec.	amid...	3	6.00–1	worm..	springs.	springs.	.....	.....	right.	right.	Peerless.....TC2
.....	.....	.....	cent..	motor.	.....	925	14½	Stmbg.	.....	.....	cone..	selec.	unit-j..	4	7.45–1	dbl chn.	rad-rd..	.....	.....	.....	right.	right.	Peerless.....TC3
.....	.....	.....	cent..	motor.	.....	.....	.....	Stmbg.	.....	.....	cone..	selec.	unit-j..	4	8.70–1	dbl chn.	rad-rd..	.....	.....	.....	right.	right.	Peerless.....TC4
.....	.....	.....	cent..	motor.	.....	.....	.....	Stmbg.	.....	.....	cone..	selec.	unit-j..	4	10.50–1	dbl chn.	rad-rd..	.....	.....	.....	right.	right.	Peerless.....TC5
.....	.....	.....	cent..	motor.	.....	.....	.....	Stmbg.	.....	.....	cone..	selec.	unit-j..	4	10.50–1	dbl chn.	rad-rd..	.....	.....	.....	right.	right.	Peerless.....TC6
.....	Dyneto..	75.00	.....	.....	none....	2,200	42½	Zenith..	grav.	seat..	dry-d..	selec.	unit-m.	3	4.75–1	bevel...	springs.	springs.	int.....	ext....	left..	cent..	Pennsy.....15
.....	.....	.....	cent..	motor.	own....	1,050	16	own....	grav.	seat..	cone..	selec.	amid...	3	7.00–1*	worm..	rad-rd..	t-arm..	int-r-w.	ext-sht.	right.	right.	Pierce-Arrow.....
.....	.....	.....	cent..	motor.	own....	950	14	own....	grav.	seat..	cone..	selec.	amid...	3	7.80–1*	worm..	rad-rd..	t-arm..	int-r-w.	ext-sht.	right.	right.	Pierce-Arrow.....
s&l-2...	Apple...	stock..	.....	.....	none....	2,800	35	Stmbg..	grav.	dash.	wet-d.	selec.	unit-m.	3	4.25-1	bevel...	springs.	t-arm..	int-r-w.	ext-r-w.	left..	cent..	Pullman.....4-24
s&l....	Spltdrf..	85.00	.....	.....	none....	2,500	42	Carter..	grav.	seat..	dry-p..	selec.	unit-m.	3	5.80–1	worm..	springs.	springs.	int-r-w.	int-r-w.	left..	cent..	Rainier.....
s&l-2...	Remy...	stock..	.....	.....	none	.....	.....	Johns..	grav.	dash.	dry-d..	selec.	amid...	3	4.30–1	sp-bev..	springs.	t-arm..	none...	2s-r-w.	left .	.cent	Reo.....F
.....	.....	.....	hydr.	motor.	own....	1,250	14	Johns..	grav.	seat..	dry-d..	selec.	amid...	3	8.70–1	dbl chn.	rad-rd..	.....	ext-r-w	.ext-j-s.	left..	.cent	Reo.....J
lighting.	Bosch...	stock..	suct.	motor.	Ruggles.	1,050	20	.....	grav.	dash.	dry-d..	selec.	unit-m.	3	5.36–1	int-g...	springs.	springs.	ext-sht.	int-r-w.	left..	cent..	Republic.....9
s&l-2...	Bosch...	.....	suct.	motor.	Ruggles.	1,050	15	Stmbg.	grav.	seat.	dry-d..	selec.	unit-m.	3	7.00–1	int-g...	springs.	springs.	int-r-w.	ext-r-w.	left..	cent..	Republic.....10
s&l-2...	Bosch...	.....	suct.	motor.	Ruggles.	1,200	15	Stmbg..	grav.	seat.	dry-d..	selec.	unit-m.	3	8.00–1	int-g...	springs.	springs.	int-r-w.	ext-r-w.	left..	cent..	Republic.....11
s&l-2...	Bosch...	.....	suct.	motor.	Ruggles.	950	12	Stmbg	grav.	seat.	dry-d..	selec.	unit-m.	3	8.00–1	int-g...	springs.	springs.	int-r-w.	ext-r-w.	left..	cent..	Republic.....12
s&l-2...	Bosch...	.....	suct.	motor.	Ruggles.	1,025	10	Stmbg	grav.	seat.	dry-d..	selec.	unit-m.	4	11.00–1	int-g...	springs.	springs.	int-r-w.	ext-r-w.	left..	cent..	Republic.....T
s&l-2...	Westghs.	225.00	l-b...	motor..	own....	1,180*	14½	own....	grav.	seat..	cone..	selec.	amid...	4	10.00–1	worm..	rad-rd..	t-arm..	int-r-w.	ext-sht.	right.	right.	Riker.....
s&l-2...	Westghs.	225.00	l-b...	motor..	own....	1,350*	14½	own....	grav.	seat..	cone..	selec.	amid...	4	10.00–1	worm..	rad-rd..	t-arm..	int-r-w.	ext-sht.	right.	right.	Riker.....
starting.	.....	stock..	suct..	motor..	Mon'rch.	1,600*	25*	Master.	grav.	seat..	dry-p..	ind-c.	amid...	3	.....	worm..	springs.	springs.	int-r-w.	int-r-w.	right.	right.	Royal.....
starting.	.....	stock..	suct..	motor..	Mon'rch.	1,600	18	Master.	grav.	seat'	dry-p..	ind-c.	amid...	3	.....	worm..	springs.	springs.	int-r-w.	int-r-w.	right.	right.	Royal.....
starting.	.....	stock..	suct..	motor..	Mon'rch.	1,600	15	Master.	grav.	seat..	dry-p..	ind-c.	amid...	3	.....	worm..	springs.	springs.	int-r-w.	int-r-w.	right.	right.	Royal.....

ABBREVIATIONS: (continued).—*Allis-Chalmers*; **G & D,** *Gray & Davis*; Westghs, *Westinghouse*; N-East, *Northeast*; Huff-S, *Huff-Simms*; Spl-App, *Splitdorf-Apple*. **Governor Type** cent, c't, *centrifugal*; suct, *suction or gas velocity*; l-b, *loose-ball*; hydr, *hydraulic*. **Governor Drive** motor, *from motor*; d-shft, *from driveshaft*; duplex, *from both motor and driveshaft or front wheel*; f-wheel, f-whl, *from front wheel*. **Governor Make** Wauk'a, *Waukesha*; Mon'rch, Mon, *Monarch*; Her-Sp, *Herschell-Spillman*; Milwkee, *Milwaukee*. **Carbureter Make,** Scheb, *Schebler*; Ray, *Rayfield*; Stmbg, *Stromberg*; Shkspr, *Shakespeare*; Flech, *Flechter*; Zen, *Zenith*, Johns, *Johnson*. **Fuel Feed,** grav, *gravity*; vac, *vacuum*; pres, *pressure*. **Tank Location,** seat, *under seat*; dash, *in dash*; rear, *at rear*; r-bd, *on running-board*. **Clutch Type,** dry-d, *dry multiple disk*; dry-p, *dry plate*: wet-d, *multiple-disk in oil*; wet-p, *plate-in-oil*. **Gearset Type,** selec, *selective sliding gear*; prog, *progressive sliding gear*; ind-c, *individual clutch, constant-mesh*; plan, *planetary*; fric, *friction*; elec, *electric*. **Gearset Location,** amid, *amidships*; unit-m, *unit with motor*; unit-j, *unit with jackshaft*; unit-x, *unit with axle*. **Final Drive,** int-g, *internal-gear*; worm, *top worm*; dbl chn, *double side chains*; sp-bevel, *spiral bevel*; db-red, *double-reduction, bevel and spur gears*; ext-g, *external-gear*; **-f,** *to front wheels*; **-4,** *on all four wheels*. **Propulsion Taken By,** rad-rd, *radius rods*; tor-t, *torsion-tube*; sub-f, *sub-frame*; spg's, *springs*. **Torque Taken By,** rad-rd, *radius rods*; tor-t, *torsion-tube*; t-arm, *torque-arm*; sub-f, *sub-frame*; sp'gs, *springs*. **Brakes, Type,** ext, ex, *external contracting*; int, *internal expanding*. **Brake Location, -r-w,** *rear wheel*; **-sht,** *shaft*; **-f-w,** *front wheel*; **-j-s,** *jackshaft*; **-4-w,** *on all four wheels*. **Control, Levers,** cent, *center*; **c & r,** *gearshift center, brake right*; **c & l,** *gearshift center, brake left*.

Technical Specifications of Gasoline

Name and Model	Capacity in Pounds	Price of Chassis	Wheelbase in Inches	FRAME		TIRES			Wheels	MOTOR									
				Material	Construction	Kind	SIZES IN INCHES Front	SIZES IN INCHES Rear		No. of Crankshaft Bearings	Bore and Stroke	N.A.C.C. Hp.	Cylinders Cast	Valves Placed	COOLING Water Circulation	COOLING Radiator Core and Case	IGNITION Typ	IGNITION Make	IGNITION Spark Advance
Royal	10,000	.....	168*	rolled-c..	.....	solid....	36x6	40x6d	wood-ov.	3	4-4¾x5½	36.15	pairs....	opp....	cent...	cell-cast...	sing..	Bosch.....	fixed...
Royal	12,000	.....	158*	rolled-c..	.....	solid....	36x6	40x6d	wood-ov.	3	4-5¼*x6*	42.20*	pairs....	opp....	cent...	cell-cast...	sing..	Bosch.....	fixed...
Royal	14,000	.....	158*	rolled-c..	.....	solid....	36x7	40x7d	wood-ov.	3	4-5½x7	44.20	pairs....	opp....	cent...	cell-cast...	sing..	Bosch.....	fixed...
Rush.....D	1,000	$ 695	105	pr-steel..	flexible..	pneu....	31x4	31x4	wood-ov.	2	4-3½x5	16.92	block...	right...	thermo.	fin-cast....	sing...	Conn.....	hand....
Sanford.....O	2,000	1,290	120	pr-steel..	flexible..	pneu*...	34x4½*	35x5*	wood-sq.	3	4-3½x5½	19.61	block...	right...	thermo.	fin-cast....	sing..	Dixie.....	fixed...
Sanford.....R	3,000	1,370	138	pr-steel..	semi-flx..	solid*..	36x3½*	36x4*	wood-sq.	3	4-3½x5½	19.61	block...	right...	thermo.	fin-cast....	sing..	Dixie.....	fixed...
Sanford.....S	4,000	2,100	150*	rolled-c..	flexible..	solid....	36x4	36x7	wood-sq.	3	4-4½x5½	29.00	block...	right...	cent...	fin-cast....	sing..	Dixie.....	fixed...
Saurer.....L	10,000	4,800	153½	pr-steel..	semi-flx..	solid....	36x5	42x5d..	wood-sq.	3	4-4¾x5½	34.28	pairs....	opp....	cent...	cell-sheet..	sing..	Bosch.....	hand....
Saurer.....M	13,000	5,800	156½	pr-steel..	semi-flx..	solid....	36x5	42x6d	wood-sq.	3	4-4¾x5½	34.28	pairs....	opp....	cent...	cell-sheet..	sing..	Bosch.....	hand....
Schleicher	6,000	3,500	150*	rolled-c..	rigid....	solid....	34x4½	34x3½d	wood-ov.	3	4-4½x5½	29.00	pairs....	right....	cent...	sq-t-sheet..	dual-d	Bosch.....	hand....
Schleicher	10,000	4,500	150*	rolled-c..	rigid....	solid....	34x5	34x4d	wood-ov.	3	4-5x6	40.00	pairs....	right....	cent...	sq-t-sheet..	dual-d	Bosch.....	hand....
Selden.....G	1,500	985	110	pr-steel..	semi-flx..	pneu....	32x3½	33x4	wood-sq.	2	4-3¼x4½	15.64	block...	right...	thermo.	sq-t-sheet..	sing..	Dixie.....	fixed...
Selden.....TL	2,000	1,700	126½	pr-steel..	semi-flx..	solid....	34x3	34x4	wood-sq.	3	4-3½x5	19.61	block...	right...	thermo.	sq-t-sheet..	sing..	Bosch.....	fixed...
Selden.....JC	4,000	2,000	150	pr-steel..	semi-flx..	solid....	36x4	36x6	wood-sq.	3	4-3½x5½	22.50	block...	left....	cent...	sq-t-sheet..	sing..	Bosch.....	fixed...
Selden.....JWW	4,000	2,250	150	pr-steel..	semi-flx..	solid....	36x4	36x6	wood-sq.	3	4-4¼x5½	27.20	block...	left....	cent...	sq-t-sheet..	sing..	Bosch.....	fixed...
Selden.....N	7,000	2,950	164	pr-steel..	semi-flx..	solid....	36x5	36x5d	wood-sq.	3	4-4½x5½	32.40	pairs....	left....	cent...	sq-t-cast..	sing..	Eisemann..	hand....
Service.....120	2,000	1,375	135	pr-steel..	flexible..	solid*..	34x3*	34x4*	wood-sq.	3	4-3½x5½	19.61	block...	right...	thermo.	fin-cast....	sing..	Bosch.....	hand....
Service.....130	3,000	1,950	150	pr-steel..	.....	solid....	36x3½	35x5	wood-sq.	3	4-4¼x5½	27.20	block...	right...	cent...	fin-cast....	sing..	Eisemann..	hand....
Service.....140	4,000	2,250	160*	pr-steel..	rigid....	solid....	36x4	36x7	wood-sq.	3	4-4¼x5½	27.20	block...	right...	cent...	fin-cast....	sing..	Eisemann..	hand....
Service.....170	7,000	3,000	170*	pr-steel..	rigid....	solid....	36x5	36x5d	wood-sq.	3	4-4¼x5½	29.00	block...	right...	cent...	fin-cast....	sing..	Eisemann..	hand....
Service.....175	7,000	3,250	170*	pr-steel..	rigid....	solid....	36x5	36x5d	wood-sq.	3	4-4¼x6	32.40	block...	right...	cent...	fin-cast....	sing..	Eisemann..	hand....
Service.....200	10,000	4,000	170*	pr-steel..	rigid....	solid....	36x6	40x6d	wood-sq.	3	4-4¼x6	32.40	block...	right...	cent...	fin-cast....	sing..	Eisemann..	hand....
Signal.....F	2,000	1,550	144*	pr-steel..	semi-flx..	solid....	34x3	36x4	wood-sq.	3	4-3¾x5½	22.50	block...	left....	cent...	fin-cast....	sing..	Eisemann..	fixed...
Signal.....H	3,000	1,800	144*	pr-steel..	semi-flx..	solid....	34x3½	36x5	wood-sq.	3	4-4¼x5½	27.20	block...	left....	cent...	fin-cast....	sing..	Eisemann..	fixed...
Signal.....J	4,000	2,100	150*	pr-steel..	semi-flx..	solid....	34x4	36x4d	wood-sq.	3	4-4¼x5½	27.20	block...	left....	cent...	fin-cast....	sing..	Eisemann..	fixed...
Signal.....M	7,000	3,000	168	pr-steel..	semi-flx..	solid....	36x5	40x5d	wood-sq.	3	4-4¼x5½	32.40	pairs....	left....	cent...	fin-cast....	sing..	Eisemann..	fixed...
Signal.....R	10,000	4,000	180	pr-steel..	semi-flx..	solid....	36x6	40x6d	wood-sq.	3	4-4¼x5½	32.40	pairs....	left....	cent...	fin-cast....	sing..	Eisemann..	hand....
Standard.....70	4,000	2,000	140	.....	.....	solid....	36x4	36x6	.....	3	4-4¼x5½	27.20	block...	left....	cent...	fin-sheet..	sing..	Eisemann..	auto....
Standard.....60	7,000	2,850	144*	.....	.....	solid....	36x5	36x5d	.....	3	4-4¼x5½	32.40	pairs....	left....	cent...	fin-sheet..	sing..	Eisemann..	auto....
Standard.....40	8,000	3,025	144*	.....	.....	solid....	36x5	36x5d	.....	3	4-4¼x5½	32.40	pairs....	left....	cent...	fin-sheet..	sing..	Eisemann..	auto....
Standard.....50	10,000	3,400	144*	.....	.....	solid....	36x5	40x6d	.....	3	4-4½x5½	29.00	pairs....	left....	cent...	fin-sheet..	sing..	Eisemann..	auto....
Steele.....C	4,000	2,250	115*	rolled-c..	semi-flx..	solid....	38x5	40x4d	cast-cr..	3	4-4¼x5½	27.20	block...	right...	cent...	cell-sheet..	sing..	At Kent	auto....
Steele.....B	6,000	3,000	127*	rolled-c..	semi-flx	solid....	38x6	40x5d	cast-cr..	3	4-5x5	40.00	pairs....	head....	cent...	cell-sheet..	sing..	At Kent	auto....
Steele.....BA	8,000	3,500	127*	rolled-c..	semi-flx..	solid....	38x6	40x5d	cast-cr.	3	4-5x5	40.00	pairs....	head....	cent...	cell-sheet..	sing..	At Kent	auto....
Steele.....A	10,000	4,000	127*	rolled-c..	semi-flx..	solid....	38x7	40x6d	cast-cr..	3	4-5x5	40.00	pairs....	head....	cent...	cell-sheet..	sing..	At Kent	auto....
Sterling	5,000	2,800	156*	pr-steel..	rigid....	solid....	36x4	36x4d*	wood-sq	3	4-4¼x5¾	29.00	pairs....	right....	cent...	fin-cast....	sing..	Eisemann..	auto....
Sterling	7,000	3,400	158*	pr-steel..	rigid....	solid....	36x5	36x5d	wood-sq	3	4-4¼x5½	29.00	pairs....	right....	cent...	fin-cast....	sing..	Eisemann..	auto....
Sterling	10,000	4,500	168	pr-steel..	.....	solid....	36x5	40x6d	wood-sq.	3	4-4¼x6½	36.15	pairs....	right....	cent...	fin-cast....	dual..	Eisemann..	auto....
Sterling	14,000	4,750	168	pr-steel..	.....	solid....	36x6	40x7d	wood-sq.	3	4-4¼x6½	36.15	pairs....	opp....	cent...	fin-cast....	dual..	Eisemann..	auto....
Stewart.....5	1,000	695	106	pr-steel..	semi-flx..	pneu....	32x4	32x4	wood-ov.	2	4-3x4½	14.40	block...	l & h...	thermo.	fin-sheet..	sing..	Dixie.....	fixed...
Stewart.....3	1,500	1,290	118	pr-steel..	semi-flx.	pneu....	34x4½	34x4½	wood-ov.	3	4-3½x5½	19.61	block...	right...	thermo.	fin-sheet..	sing..	Dixie.....	fixed...
Stewart.....4	2,500	1,390	128	pr-steel..	semi-flx..	solid....	35x3	35x4	wood-sq.	3	4-3½x5½	19.61	block...	right...	thermo.	fin-sheet..	sing..	Dixie.....	fixed...
Studebaker.....SF	1,000	785	112	pr-steel..	rigid....	pneu....	34x4	34x4	wood-ov	3	4-3¾x5	24.22	block...	left....	cent...	fin-sheet..	sing..	Remy.....	hand....
Studebaker.....7	2,000	1,100	125	pr-steel..	rigid....	pneu....	35x5	35x5	wood-ov.	3	4-3¾x5	24.22	block...	left....	cent...	fin-sheet..	sing..	Remy.....	hand....
Sullivan.....G	3,000	1,650	129	rolled-c..	semi-flx	solid....	36x3	36x4	wood-sq.	2	4-3¾x4½	22.50	block...	right...	thermo.	fin-sheet..	sing..	Bosch.....	fixed...
Sullivan.....E	4,000	2,250	150	pr-steel..	semi-flx	solid....	36x4	36x6	wood-sq.	3	4-4¼x5½	27.20	block...	right...	cent...	fin-sheet..	sing..	Bosch.....	fixed...
Superior.....A	2,000	1,350	124*	pr-steel..	.....	solid....	34x3½	34x4	wood-sq.	3	4-3½x5	19.61	block...	head....	thermo.	sq-t-sheet..	sing..	Eisemann..	fixed...
Superior.....C	4,000	1,800	144	pr-steel..	.....	solid....	36x4	36x6	wood-sq.	3	4-3½x5	22.50	block...	head....	gear...	sq-t-sheet..	sing..	Eisemann..	fixed...
Thomas.....40	5,000	2,700	150*	pr-steel..	semi-flx..	solid....	34x4	34x4d	wood-sq.	3	4-4¼x5½	27.20	block...	left....	cent...	cell-sheet..	sing..	Bosch.....	fixed...
Tifin.....A	1,500	1,190	110	pr-steel..	flexible..	pneu*...	35x4½*	35x4½*	wood-ov.	2	4-3½x5	19.61	block...	right...	thermo.	fin-sheet..	sing..	Bosch.....	hand....
Tifin.....AW	2,000	1,450	112	pr-steel..	flexible..	solid....	34x3	34x4	wood-sq.	2	4-3½x5	19.61	block...	right...	thermo.	fin-sheet..	sing..	Bosch.....	hand....
Tifin.....GW	3,000	1,790	135	pr-steel..	flexible..	solid....	36x3½	36x5	wood-sq.	3	4-3½x5½	22.50	block...	left....	cent...	fin-sheet..	sing..	Bosch.....	hand....
Tifin.....MC	5,000	2,360	140	pr-steel..	semi-flx..	solid....	36x4	36x3½d	wood-sq.	3	4-4¼x5½	27.20	block...	left....	cent...	fin-sheet..	sing..	Bosch.....	hand....
Tifin.....MW	5,000	2,500	140	pr-steel..	semi-flx..	solid....	36x4	36x3½d	wood-sq.	3	4-4¼x5½	27.20	block...	left....	cent...	fin-sheet..	sing..	Bosch.....	hand....
Tifin.....RW	10,000	4,250	168	rolled-I..	semi-flx..	solid....	36x5	40x5d	wood-sq	3	6-3½x5½	33.75	threes...	right....	cent...	fin-sheet..	sing..	Bosch.....	hand....
Tifin.....SW	12,000	4,550	168	rolled-I..	semi-flx..	solid....	36x6	40x6d	wood-sq	3	6-3½x5½	33.75	threes...	right....	cent...	fin-sheet..	sing..	Bosch.....	hand....
Transport Tractor.....T	10,000	2,500	80	rolled-c..	rigid....	solid....	34x3½	34x4d	wood-ov.	3	4-3½x5½	19.61	block...	right...	thermo.	cell-sheet..	sing..	Bosch.....	fixed...
Union.....B	5,000	1,875	150	pr-steel..	flexible..	solid....	39x4	39x6	wood-sq.	4	4-4x6	25.60	block...	left....	cent...	fin-cast....	sing..	Eisemann..	hand....
United.....BSW	4,000	2,250	144*	rolled-c..	rigid....	solid....	36x4	36x4d	wood-sq.	3	4-4¼x5½	27.20	block...	left....	cent...	cell-cast...	sing..	Eisemann..	hand....
United.....CSW	7,000	2,900	144*	rolled-c..	rigid....	solid....	36x5	36x5d	wood-sq.	3	4-4½x5½	32.40	pairs....	left....	cent...	cell-cast...	sing..	Eisemann..	hand....
United.....DSW	8,000	3,300	144*	rolled-c..	rigid....	solid....	36x5	36x6d	wood-sq.	3	4-4½x5½	36.15	pairs....	opp....	cent...	cell-cast...	sing..	Eisemann..	hand....
United.....ESW	10,000	3,900	144*	rolled-c..	rigid....	solid....	36x6	40x6d	cast-cr..	3	4-5⅞x5½	41.62	pairs....	opp....	cent...	fin-cast....	sing..	Eisemann..	hand....
U. S.....E	4,000	2,200	132*	rolled-c..	semi-flx..	solid....	34x3½	36x3½d	wood-sq.	3	4-4½x5½	27.20	block...	left....	cent...	sq-t-sheet..	dual..	Bosch.....	hand....
U. S.....H	4,000	2,500	144*	rolled-c..	semi-flx..	solid....	34x4	36x4d	wood-sq.	3	4-4½x5½	27.20	block...	left....	cent...	sq-t-sheet..	dual..	Bosch.....	hand....
U. S.....D	6,000	2,700	144*	rolled-c..	semi-flx..	solid....	34x5	36x5d	wood-sq.	3	4-4½x5½	32.40	pairs....	left....	cent...	sq-t-sheet..	dual..	Bosch.....	hand....
U. S.....J	7,000	3,150	156*	rolled-c..	semi-flx..	solid....	36x5	40x5d	wood-sq.	3	4-4½x5½	32.40	pairs....	left....	cent...	sq-t-sheet..	dual..	Bosch.....	hand....
U. S.....K	10,000	4,000	168*	rolled-c..	semi-flx..	solid....	36x6	40x6d	wood-sq.	3	4-4½x6½	36.15	pairs....	left....	cent...	sq-t-sheet..	dual..	Bosch.....	hand....
Universal.....G	3,000	1,950	133*	rolled-c..	rigid....	solid....	34x3½	34x5	wood-ov.	2	4-3½x5½	22.50	block...	right...	thermo.	fin-cast....	dual..	Eisemann..	.....
Universal.....D	4,000	2,800	132*	rolled-c..	rigid....	solid....	36x4	36x4d	wood-ov.	3	4-4x5½	25.60	pairs....	opp....	cent...	cell-sheet..	dual..	Eisemann..	.....
Universal.....A	6,000	3,400	132*	rolled-I..	rigid....	solid....	36x5	36x5d	wood-ov.	3	4-4x5½	25.60	pairs....	opp....	cent...	cell-sheet..	dual..	Eisemann..	hand....
Velie.....25	4,000	2,250	150*	pr-steel..	flexible..	solid....	36x4	36x3½d	wood-sq.	3	4-4¼x5½	27.20	block...	left....	cent...	fin-cast....	sing..	Bosch.....	hand....
Velie.....26	7,000	3,350	172*	pr-steel..	flexible..	solid....	36x5	40x5d	wood-sq.	3	4-4½x5½	32.40	pairs....	left....	cent...	fin-cast....	sing..	Bosch.....	hand....

ABBREVIATIONS: General, *, *with other options;* opt, *optional;* **Price,** -c, *complete with body.* **Frame, Material,** pr-steel, *pressed steel;* rolled-c, *rolled steel, channel section;* rolled-I, *rolled steel, I section;* **Frame Construction,** semi-flx, *semi flexible.* **Tires, kind,** Pneu, *pneumatic;* cush, *cushion,* p & s, *pneumatic front, solid, rear;* s & st, *solid rubber front, steel in rear.* **Tire Sizes,** -d, *dual.* **Wheels,** pr-steel, *pressed steel;* -ov, *oval spokes;* -sq, *square spokes;* -d, *disk or web type;* -hol, *hollow spokes;* -cr, *cruciform spokes;* -x, *cross-shaped solid spokes.* **Cylinders cast,** sing, *singly or individually.* **Location of valves,** opp, *opposite, T-head motor;* r & h, *one valve at right, the other in head, L-head motor;* l & h, *one valve at left the other in head, L-head motor.* **Water circulation,** cent, *centrifugal pump;* thermo-, *thermo-syphon or natural circulation;* gear, *gear pump.* **Radiator Type,** fin, *individually finned tubes;* sq-t, *square-tubular, resembling cellular, sometimes known as flat-tubular;* z-z-t, *zig-zag tubular, resembling cellular,* cell, *cellular or honeycomb type;* tube, *plain tubes without fins;* ring, *tubes arranged in ring about blower fan.* **Radiator Case,** -sheet, *sheet metal;* -cast, *cast metal, built up.* **Ignition Type,** sing, *single;* doub, *double,* dual-d, *dual-double.* **Make of Magneto** (or other sparking device), Conn., *Connecticut;* storage, *storage battery;* Westghs, *Westinghouse;* G & D, *Gray & Davis;* At Kent, *Atwater Kent.* **Spark Advance,** auto, *automatic;* 2-pt-fix, *two-point fixed, battery circuit in retard, magneto in advance.* **Electric System Type,** s, l & i, *starting, lighting and ignition, combination unit;* s & l, *starting and lighting, combination unit;* s & l-2, *starting and lighting, two-unit;* l & i, *lighting and ignition, combination unit.* **Electric System, Make,** Splitdf, *Splitdorf;* Al-Chal,—**(Abbreviations Continued on Opposite Page.)**

Commercial Vehicles for 1917—Continued

MOTOR										TRANSMISSION							BRAKES		CONTROL		
ELECTRIC SYSTEM			GOVERNOR		SPEED		FUEL SYSTEM				GEARSET										
Type	Make	Extra Cost	Type	Drive	Make	Motor in r. p. m.	Truck in m. p. h.	Carbureter Make	Fuel Feed	Tank Location	Clutch Type	Type	Location	Sp'ds	Total Gear Reduction in High	Final Drive	Propulsion Taken By	Torque Taken By	Hand	Foot	Steer	Levers	Name and Model
starting		stock	suct.	motor	Mon'rch.	900*	10*	Master	grav.	seat	wet-d.	ind-c.	amid	3		worm	springs	springs	int-r-w.	int-r-w.	right.	right.	**Royal**
			suct.	motor	Mon'rch.	900*	10*	Master	grav.	seat	wet-d.	ind-c.	amid	3		worm*	sp'gs*	sp'gs*	int-r-w.	int-r-w.	right.	right.	**Royal**
			suct.	motor	Mon'rch.	900*	10*	Master	grav.	seat	wet-d.	ind-c.	amid	3		dblchn.	rad-rd.		int-r-w.	int-r-w.	right.	right.	**Royal**
s&l-2	Spltdorf.	stock				1,600	29	Carter	grav.	seat	dry-d.	selec.	unit-m.	3	4.42–1	bevel	springs	springs	int-r-w.	ext-r-w.	left	cent.	**Rush** D
						1,100	16	Scheb.	grav.	seat	dry-d.	selec.	unit-m.	3	7.00–1	int-g	springs	springs	int-r-w.	int-r-w.	left	cent.	**Sanford** O
			cent.	motor	Pierce	1,150	14		grav.	seat	dry-d.	selec.	unit-m.	3	8.99–1	dblchn.	rad-rd.		int-r-w.	ext-r-w.	left	cent.	**Sanford** R
						1,175	14	Scheb.	grav.		dry-d.	selec.	unit-m.	3	9.00–1	int-g	springs	springs	int-r-w.	ext-r-w.	left	cent.	**Sanford** S
none			cent.	motor	own	1,000	8*	own	pres.	rear	cone	selec.	unit-j.	4	15.85-1*	dblchn.	rad-rd.		int-r-w.	ext-sht.	right.	right.	**Saurer** L
none			cent.	motor	own	1,000	9½*	own	pres.	rear	cone	selec.	unit-j.	4	14.80-1*	dblchn.	rad-rd.		int-r-w.		right.	right.	**Saurer** M
none					opt	1,200	25	Stmbg.	grav.	seat						dblchn.	rad-rd.		ext-r-w.	ext-sht.	right.	right.	**Schleicher**
none						1,200	20	Stmbg.	grav.	seat	cone	selec.	amid	4	5.00–1	dblchn.	rad-rd.		ext-r-w.	ext-sht.	right.	right.	**Schleicher**
s&l	N-East.	80 00	cent.	motor	Milwkee.	1,200	20	Scheb.	grav.	seat	dry-d.	selec.	unit-m.	3	6.20–1	worm	springs	springs	int-r-w.	int-r-w.	right.	cent.	**Selden** G
s&l-2*	N-East.	175 00	cent.	motor	Pierce	1,135	17	Stmbg.	grav.	seat	dry-d.	selec.	unit-m.	3	6.75–1	worm	springs	springs	int-r-w.	int-r-w.	right.	cent.	**Selden** TL
s&l-2*	N-East.	150 00	cent.	motor	Pierce	1,295	14¾	Stmbg.	grav.	seat	dry-d.	selec.	unit-m.	3	9.45–1	int-g	springs	springs	int-r-w.	ext-r-w.	left*	cent	**Selden** JC
s&l*	N-East.		cent.	motor	Pierce	1,295	15	Stmbg.	grav.	seat	dry-d.	selec.	unit-m.	3	9.25–1	worm	springs	springs	int-r-w.	ext-r-w.	left*	cent	**Selden** JWW
s&l-2*	N-East.	175 00	cent.	motor	Pierce	1,250	13	Stmbg.	grav.	seat	dry-d.	selec.	unit-m.	4	10.33–1	worm	rad-rd.	springs	int-r-w.	int-r-w.	right.	cent.	**Selden** N
s&l-2*	Westghs.	160 00*	cent.	d-shaft	Pierce	1,200	18	Stmbg.	vac.	seat	dry-d.	selec.	unit-m.	3	7.00–1	worm	springs	springs	int-r-w.	int-r-w.	left	cent.	**Service** 120
s&l-2*	Westghs.	200 00*	cent.	d-shaft	Pierce	1,090	14	Stmbg.	vac.		dry-p.	selec.	unit-m.	3	7.75–1	worm	springs	springs	int-r-w.	int-r-w.	left	cent.	**Service** 130
s&l-2*	Westghs.	200 00*	cent.	d-shaft	Pierce	1,090	14	Stmbg.	vac.		dry-p.	selec.	unit-m.	3	7.75–1	worm	springs	springs	int-r-w.	int-r-w.	left	cent.	**Service** 140
s&l-2*	Westghs.	200 00*	cent.	d-shaft	Pierce	1,090	12	Stmbg.	vac.	seat	dry-p.	selec.	unit-m.	4	8.75–1	worm	rad-rd.	springs	int-r-w.	int-r-w.	left	cent.	**Service** 170
s&l-2*	Westghs.	200 00*	cent.	d-shaft	Pierce	1,000	14	Stmbg.	vac.	seat	dry-p.	selec.	unit-m.	4	8.75–1	worm	rad-rd.	springs	int-r-w.	int-r-w.	left	cent.	**Service** 175
s&l-2*	Westghs.	200 00*	cent.	d-shaft	Pierce	1,000	10	Stmbg.	vac.	seat	dry-p.	selec.	unit-m.	4	8.75–1	worm	rad-rd.	springs	int-r-w.	int-r-w.	left	cent.	**Service** 200
			suct.	motor	Mon'rch.	1,100	15	Stmbg.	grav.	seat	dry-d.	selec.	unit-m.	3	7.75–1	worm	springs	springs	int-r-w.	int-r-w.	left	cent.	**Signal** F
			suct.	motor	Mon'rch.	1,200	15	Stmbg.	grav.	seat	dry-d.	selec.	unit-m.	3	8.50–1	worm	rad-rd.	springs	int-r-w.	int-r-w.	left	cent.	**Signal** H
			suct.	motor	Mon'rch.	1,300	15	Stmbg.	grav.	seat	dry-d.	selec.	unit-m.	3	9.25–1	worm	rad-rd.	springs	int.	int.	left	cent.	**Signal** J
			suct.	motor	Mon'rch.	1,300	15	Stmbg.	grav.	seat	dry-d.	selec.	unit-m.	3	10.33–1	worm	rad-rd.	springs	int-r-w.	int-r-w.	left	cent.	**Signal** M
			suct.	motor	Mon'rch.	1,700	15	Stmbg.	grav.	seat	dry-d.	selec.	amid	4	13.66–1	worm	rad-rd.	springs	int-r-w.	int-r-w.	left	cent.	**Signal** R
			suct.	motor	Mon'rch.	1,100	15	Scheb.			cone	selec.	amid	3	7.75–1	worm	rad-rd.				left	cent.	**Standard** 70
			suct.	motor	Mon'rch.	1,050	12	Stmbg.			dry-d.	selec.	unit-m.	3	10.33–1	worm	rad-rd.				left	cent.	**Standard** 60
			suct.	motor	Mon'rch.	1,050	12	Stmbg.			dry-d.	selec.	unit-m.	3	9.50–1	dblchn.	rad-rd.				left	cent	**Standard** 40
			suct.	motor	Mon'rch.	1,050	9	Stmbg.			dry-d.	selec.	unit-m.	3	13.00–1	worm	rad-rd.				left	cent	**Standard** 50
lighting	Carlton.	stock	cent.	motor	own	1,150	14½	Stmbg.		seat	wet-d.	ind-c	unit-j	3	9.52–1	dblchn	rad-rd.		int.	ext	right.	right.	**Steele** C
lighting	Carlton.	stock	cent.	motor	own	950	11	Stmbg.	grav.	seat	wet-d.	ind-c	unit-j	3	9.21–1	dblchn	rad-rd.		int.	ext	right.	right.	**Steele** B
lighting	Carlton.	stock	cent.	motor	own	950	11	Stmbg	grav.	seat	wet-d.	ind-c	unit-j	3	9.21–1	dblchn	rad-rd.		int-r-w.	ext-j-s.	right.	right.	**Steele** BA
lighting	Carlton	stock	cent	motor	own	950	9	Stmbg.	grav.	seat	wet-d.	ind-c	unit-j	3	9.58–1	dblchn	rad-rd.		int-r-w.	ext-j-s.	right.	right	**Steele** A
lighting		35 00	cent.	motor	Wauk'a.	1,040	14½	Holley	grav.	seat	dry-d.	selec.	unit-m.	3	7.70–1	worm	springs	springs	int-r-w.	int.	left	cent.	**Sterling**
lighting		35 00	cent.	motor	Wauk'a.	1,040	13		grav.		dry-d.	selec.	unit-m.	3	8.75–1	worm	springs	springs	int-r-w.	int-r-w.	left	cent.	**Sterling**
lighting		35.00	cent.	motor	Wauk'a.	950	12½	Holley	grav.		dry-d.	selec.	amid	4	8.75–1	worm	springs		int.	int.	left	cent.	**Sterling**
lighting		35.00	cent.	motor	Wauk'a.	950	10		grav.		dry-d.	selec.	amid	4	11.67–1	dblchn.	rad-rd.		ext-sht.	int-r-w.	left	cent.	**Sterling**
none					none	2,200	35	Zenith	grav.	seat	dry-p.	selec.	unit-m.	3	6.00–1	int-g	springs	springs	ext-r-w.	ext-r-w.	left	cent	**Stewart** 5
s&l-2	Westghs.	125 00			none	2,100	35	Zenith	grav.	seat	dry-p.	selec.	unit-m.	3	6.00–1	int-g	springs	springs	int-r-w.	ext-r-w.	left	cent.	**Stewart** 3
s&l-2	Westghs	125.00			none	2,100	30	Zenith	grav.	seat	dry-p.	selec.	unit-m.	3	7.00–1	int-g	springs	springs	int-r-w.	ext-r-w.	left	cent.	**Stewart** 4
s&l-2	Wagner.	stock	cent.	f-wheel	Pierce	925	20	Scheb.	vac.	rear	cone	selec.	unit-x	3	4.60–1	bevel	rad-rd.	t-arm	int-r-w.	ext-r-w.	left	cent.	**Studebaker** SF
s&l-2	Wagner.	stock	cent.	f-wheel	Pierce	975	20	Scheb.	vac.	rear	cone	selec.	unit-x	3	5.00–1	bevel	rad-rd.	t-arm	int-r-w.	ext-r-w.	left	cent.	**Studebaker** 7
								Holley	grav.	seat	cone	selec.	unit-j	3	8.50–1	dblchn.	rad-rd.		int-r-w.	ext.	left	cent.	**Sullivan** G
								Holley	vac.	seat	dry-d.	selec.	unit-m.	3	9.25–1	worm	springs	springs	int-r-w.	int-r-w.	left	cent.	**Sullivan** E
none			suct.	motor	Mon'rch.	1,300	15	Stmbg.	vac.	seat	dry-d.	selec.	unit-m.	3	7.00–1	int-g	springs	springs	int-r-w.	ext-r-w.	left	cent.	**Superior** A
none			suct.	motor	Mon'rch.	1,275	15	Stmbg.	vac.	seat	dry-d.	selec.	unit-m.	3	9.00–1	int-g	rad-rd.	springs	int-r-w.	ext-r-w.	left	cent	**Superior** C
lighting	Bosch	stock	cent.	duplex	Duplex	1,100	14	Bergen	grav.	seat	dry-d.	selec.	unit-m.	3	8.50–1	worm	springs	springs	int-r-w.	int-r-w.	left	cent.	**Thomas** 40
none					none	1,000	15	Scheb.	grav.	seat	cone	selec.	unit-m.	3	6.80–1	int-g	springs	springs	int-r-w.	ext-r-w.	left	cent.	**Tiffin** A
			cent.	motor	Pierce	1,000	15	Scheb.	grav.	seat	dry-d.	selec.	unit-m.	3	6.50–1	worm	springs	springs	int-r-w.	int-r-w.	left	cent.	**Tiffin** AW
			cent.	motor	Pierce	1,000	13½	Scheb.	grav.	seat	dry-d.	selec.	unit-m.	3	8.60–1	worm	springs	springs	int-r-w.	ext-r-w.	left	cent.	**Tiffin** GW
			cent.	motor	Pierce	1,000	12	Scheb.	grav.	seat	cone	selec.	amid	3	8.80–1	dblchn.	rad-rd.		int-r-w.	ext-r-w.	left	cent.	**Tiffin** MC
			cent.	motor	Pierce	1,000	12	Scheb.	grav.	seat	cone	selec.	amid	3	7.75–1	worm	springs	springs	int-r-w.	int-r-w.	left	cent.	**Tiffin** MW
s&l-2	Bosch	stock	cent.	motor	Pierce	1,000	10½	Scheb.	grav.	seat	dry-p.	selec.	amid	3	11.70–1	worm	springs	springs	int-r-w.	int-r-w.	left	cent.	**Tiffin** RW
s&l-2	Bosch	stock	cent.	motor	Pierce	1,000	10½	Scheb.	grav.	seat	dry-p.	selec.	amid	3	11.70–1	worm	springs	springs	int-r-w.	int-r-w.	left	cent.	**Tiffin** SW
							12	Zenith	grav.		dry-d.	selec.	unit-m.	4		worm	springs	springs	int-r-w.	int-r-w.	left	cent.	**Transport Tractor** T
none					none			Scheb.	grav.	dash	wet-d.	selec.	unit-m.	3	7.75–1	int-g	springs	springs	int-r-w.	ext-r-w.	right.	cent	**Union** B
s&l	opt.		suct.	motor	Mon'rch.	1,125	14	Stmbg.	grav.	seat	dry-d.	selec.	unit-m.	3	8.66–1	worm	springs	springs	int-r-w.	int-r-w.	left	cent.	**United** BSW
s&l	opt.		suct.	motor	Mon'rch.	980	12	Stmbg.	grav.	seat	dry-d.	selec.	unit-m.	3	8.75–1	worm	springs	springs	int-r-w.	int-r-w.	left	cent.	**United** CSW
s&l	opt.		suct.	motor	Mon'rch.	980	12	Stmbg.	grav.	seat	dry-d.	selec.	unit-m.	3	8.75–1	worm	springs	springs	int-r-w.	int-r-w.		cent.	**United** DSW
s&l-2*	opt.	200.00*	cent.	d-shaft	Pierce	987	10	Stmbg*	grav.	seat	dry-d.	selec.	amid	4	11.75–1	worm	springs	springs	int-r-w.	int-r-w.	right.	right.	**United** ESW
			cent.	motor	Pierce	1,170	15	Stmbg.	grav.	seat	cone	ind-c.	amid	3	8.16–1	dblchn.	rad-rd.		int-r-w.	ext-r-w.	left	cent.	**U. S.** E
			cent.	motor	Pierce	1,190	15	Stmbg.	grav.	seat	cone	ind-c.	amid	3	8.66–1	worm	springs	springs	int-r-w.	int-r-w.	left	cent.	**U. S.** H
			cent.	motor	Pierce	1,092	14	Stmbg.	grav.	seat	cone	ind-c.	amid	3	8.01–1	dblchn.	rad-rd.		int-r-w.	ext-r-w.	left	cent.	**U. S.** D
			cent.	motor	Pierce	1,092	13	Stmbg.	grav.	seat	cone	ind-c.	amid	3	11.70–1	worm	springs	springs	int-r-w.	int-r-w.	left	cent.	**U. S.** J
			cent.	motor	Wauk'a.	900	12½	Stmbg.	grav.	seat	cone	ind-c.	amid	3	8.75–1	worm	springs	springs	int-r-w.	int-r-w.	right.	cent.	**U. S.** K
lighting		stock	l-b.	motor	own	1,160	15	Zenith	grav.	seat	dry-p.	selec.	unit-m.	3	7.25–1	worm	rad-rd.		int.	int.	left	cent.	**Universal** G
lighting		stock	l-b.	motor	own	1,057	12	Heath.	grav.	seat	dry-d.	selec.	amid	3	9.16–1	dblchn.	rad-rd.		ext.	int.	right.	right.	**Universal** D
lighting		stock	l-b.	motor	own	1,057	12	Heath.	grav.	seat	dry-d.	selec.	amid	3	10.29–1	dblchn.	rad-rd.		ext-sht.	int-r-w.	right.	right.	**Universal** A
starting	Remy	120.00	cent.	motor	Pierce	1,008	18	Stmbg.	vac.	seat	dry-p.	selec.	amid	4	6.00–1	worm	springs	springs	int-r-w.	int-r-w.	right.	right.	**Velie** 25
none			cent.	motor	Pierce	1,215	14	Stmbg.	cav.	seat	dry-p.	selec.	amid	4	10.30–1	worm	rad-rd.	springs	int.	int.	right.	right.	**Velie** 26

ABBREVIATIONS: (continued).—*Allis-Chalmers*; G & D, *Gray & Davis*; Westghs, *Westinghouse*; N-East, *Northeast*; Huff-S, *Huff-Simms*; Spl-App, *Splitdorf-Apple*. **Governor Type** cent, c't, *centrifugal*; suct, *suction or gas velocity*; l-b, *loose-ball*; hydr, *hydraulic*. **Governor Drive** motor, *from motor*; d-shft, *from driveshaft*; duplex, *from both motor and driveshaft or front wheel*; f-wheel, f-whl, *from front wheel*. **Governor Make** Wauk'a, *Waukesha*; Mon'rch, Mon, *Monarch*; Her-Sp, *Herschell-Spillman*; Milwkee, *Milwaukee*. **Carbureter Make,** Scheb, *Schebler*; Ray, *Rayfield*; Stmbg, *Stromberg*; Shkspr, *Shakespeare*; Flech, *Flechter*; Zen, *Zenith*, Johns, *Johnson*. **Fuel Feed,** grav, *gravity*; vac, *vacuum*; pres, *pressure.* **Tank Location,** seat, *under seat*; dash, *in dash*; rear, *at rear*; r-bd, *on running-board*. **Clutch Type,** dry-d, *dry multiple disk*; dry-p, *dry plate:* wet-d, *multiple-disk in oil*; wet-p, *plate-in-oil*. **Gearset Type,** selec, *selective sliding gear*; prog, *progressive sliding gear*; ind-c, *individual clutch, constant-mesh*; plan, *planetary*; fric, *friction*; elec, *electric*. **Gearset Location,** amid, *amidships*; unit-m, *unit with motor*; unit-j, *unit with jackshaft*; unit-x, *unit with axle*. **Final Drive,** int-g, *internal-gear*; worm, *top worm*; dbl chn, *double side chains*; sp-bevel, *spiral bevel*; db-red, *double-reduction, bevel and spur gears*; ext-g, *external-gear*; -f, *to front wheels*; -4, *on all four wheels*. **Propulsion Taken By,** rad-rd, *radius rods*; tor-t, *torsion-tube*; sub-f, *sub-frame*; sp'gs, *springs*. **Torque Taken By,** rad-rd, *radius rods*; tor-t, *torsion-tube*; t-arm, *torque-arm*; sub-f, *sub-frame*; sp'gs, *springs*. **Brakes, Type,** ext, ex, *external contracting*; int, *internal expanding*. **Brake Location,** -r-w, *rear wheel*: -sht, *shaft*; -f-w, *front wheel*; -j-s, *jackshaft*; -4-w, *on all four wheels*. **Control, Levers,** cent, *center*; c & r, *gearshift center, brake right*; c & l, *gearshift center, brake left*.

Technical Specifications of Gasoline

Name and Model	Capacity in Pounds	Price of Chassis	Wheelbase in Inches	FRAME Material	FRAME Construction	TIRES Kind	TIRES SIZES IN INCHES Front	TIRES SIZES IN INCHES Rear	Wheels	MOTOR No. of Crankshaft Bearings	MOTOR Bore and Stroke	MOTOR N.A.C.C. Hp.	MOTOR Cylinders Cast	MOTOR Valves Placed	MOTOR COOLING Water Circulation	MOTOR COOLING Radiator Core and Case	MOTOR IGNITION Type	MOTOR IGNITION Make	MOTOR IGNITION Spark Advance
Walter.....C	7,000	$4,200	132*	pr-steel..	flexible..	solid....	40x6	40x6	cast-d...	3	4-4¼x6	30.65	block...	left....	cent...	fin-cast...	sing...	Eisemann*.	auto...
Walter.....B	15,000	4,750	162*	pr-steel..	flexible..	solid....	36x6	40x6	cast-hol..	3	4-4¼x6	30.65	block...	left....	cent...	fin-t-cast..	sing...	Eisemann*.	fixed...
Watson.....Tractor	10,000	3,600	80	rolled-c.	flexible..	solid....	34x4	36x5d	wood-sq.	3	4-4½x5½	32.40	pairs....	left....	cent...	cell-sheet..	dual..	Bosch.....	hand...
White.....GBBE	1,500	2,100	133½	pr-steel..	.....	pneu....	34x4½	34x4½	wood-ov.	2	4-3½x5½	22.50	block...	right...	cent...	cell-sheet..	sing...	Bosch*....	hand...
White.....TBC	3,000	3,000	145½	pr-steel..	.....	pneu....	36x4½	36x4½d	wood-ov.	2	4-3½x5½	22.50	block...	right...	cent...	cell-sheet..	sing...	Bosch*....	hand...
White.....TAD	6,000	3,700	163	rolled-I..	rigid....	solid....	36x5	40x5d	cast-x...	2	4-3½x5½	22.50	block...	right...	cent...	cell-sheet..	sing...	Bosch*....	hand...
White.....TCD	10,000	4,500	169	rolled-I..	.....	solid....	36x5	40x6d.	cast-x...	3	4-4½x6½	29.00	block...	right...	cent...	cell-sheet..	sing...	Bosch*....	hand...
Wichita.....A	2,000	1,350	110*	pr-steel..	semi-flx..	solid....	34x3	34x4	wood-sq.	2	4-3½x5	16.92	block...	left....	thermo.	cell-cast...	sing...	Bosch.....	hand...
Wichita.....K	2,000	1,650	118*	pr-steel..	semi-flx..	solid....	36x3	36x4	wood-sq.	2	4-3½x5	19.61	block...	left....	thermo.	cell-cast...	sing...	Bosch.....	hand...
Wichita.....L	3,000	1,800	118*	pr-steel..	semi-flx..	solid....	36x3	36x5	wood-sq.	2	4-3½x5	19.61	block...	left....	thermo.	cell-cast...	sing...	Bosch.....	hand...
Wichita.....B	4,000	2,100	118*	pr-steel..	semi-flx.	solid....	34x3½	34x6	wood-sq.	2	4-3½x5	19.61	block...	left....	thermo.	cell-cast...	sing...	Bosch.....	hand...
Wichita.....R	5,000	2,350	144*	pr-steel..	semi-flx..	solid....	36x4	36x7	wood-sq.	3	4-3½x5½	22.50	block...	right...	cent...	cell-cast...	sing...	Bosch.....	hand...
Wichita.....O	7,000	3,250	165*	pr-steel..	semi-flx..	solid....	36x5	36x5d	wood-sq.	3	4-4½x5½	32.40	pairs....	left....	cent...	cell-cast...	sing...	Bosch.....	hand...
Wichita.....Q	10,000	3,850	165*	pr-steel..	semi-flx..	solid....	38x6	38x6d	wood-sq.	3	4-4½x5½	32.40	pairs....	left....	cent...	cell-cast...	sing...	Bosch.....	hand...
Wilcox.....S	2,000	1,600	128	pr-steel..	rigid....	pneu*...	35x5*	35x5*	wood-ov.	3	4-3½x5	22.50	block...	right...	thermo.	cell-sheet..	sing...	Bosch.....	hand...
Wilcox.....R	3,000	1,800	134	pr-steel..	rigid....	solid....	36x4	36x5	wood-ov.	3	4-4½x5	29.00	pairs....	right...	cent...	cell-sheet..	sing...	Bosch.....	hand...
Wilcox.....Q	4,000	2,000	150*	pr-steel..	rigid....	solid....	36x4	36x3½d	wood-ov.	3	4-4½x5	29.00	pairs....	right...	cent...	cell-cast...	sing...	Bosch.....	hand...
Wilcox.....P	7,000	2,900	154*	pr-steel..	rigid....	solid....	36x5	36x5d	wood-ov.	3	4-4½x5	29.00	pairs....	right...	cent...	cell-cast...	sing...	Bosch.....	hand...
Wilson.....E	4,000	2,350	144	rolled-c.	semi-flx..	solid....	36x4	36x4d	wood-ov.	3	4-4¼x5½	27.20	block...	left....	cent...	fin-cast...	sing...	Eisemann.	fixed...
Witt Will.....WD16	2,000	2,000	120	pr-steel..	flexible..	solid*...	36x3*	36x4*	wood-sq.	3	4-3½x5½	22.50	block...	left....	cent...	sq-t-sheet..	sing...	Eisemann.	auto....
Witt Will.....WD16	4,000	2,500	144	pr-steel..	flexible..	solid....	36x3½	36x7	wood-sq.	3	4-4¼x5½	27.20	block...	left....	cent...	sq-t-sheet..	sing...	Eisemann.	auto....
Wisconsin.....B	2,500	1,650	136	pr-steel..	semi-flx..	solid....	34x3½	34x4	wood-ov.	3	4-3½x4	19.61	block...	right...	cent...	cell-sheet..	sing...	Eisemann.	hand...
Wisconsin.....C	5,000	2,500	156*	pr-steel..	semi-flx..	solid....	36x4	36x6*	wood-ov.	3	4-4x5½	25.60	pairs....	right...	cent...	cell-sheet..	sing...	Eisemann.	hand...
W. S.....4	5,000	2,975	154	rolled-c.	flexible..	solid....	36x6	36x6	wood-sq.	3	4-4½x5½	32.40	pairs....	.....	cent...	fin-cast...	dual..	Nat'l.....	hand...
Zeitler & Lamson.....	3,000	1,850	150*	pr-steel..	semi-flx..	solid....	36x3½	36x5	wood-sq.	3	4-4x5	25.60	block...	left....	cent...	cell-cast...	doub..	Bosch*....	hand...
Zeitler & Lamson.....	5,000	2,450	160*	pr-steel..	semi-flx..	solid....	36x4	36x7	wood-sq.	4	4-4x6	25.60	block...	left....	cent...	cell-cast...	doub..	Bosch*....	hand...
Zeitler & Lamson.....	7,000	3,150	170*	rolled-c.	semi-flx..	solid....	36x5	40x5d	cast-d...	3	4-4½x5½	36.15	pairs....	opp....	cent...	cell-cast...	doub..	Bosch*....	hand...
Zeitler & Lamson.....	10,000	4,150	180*	rolled-c.	semi-flx..	solid....	36x6	40x6d	cast-d...	3	4-5 1/16x5½	41.62	pairs....	opp....	cent...	cell-cast...	doub..	Bosch*....	hand...

Received Too Late to Classify

Name and Model	Capacity in Pounds	Price of Chassis	Wheelbase in Inches	FRAME Material	FRAME Construction	TIRES Kind	TIRES SIZES IN INCHES Front	TIRES SIZES IN INCHES Rear	Wheels	MOTOR No. of Crankshaft Bearings	MOTOR Bore and Stroke	MOTOR N.A.C.C. Hp.	MOTOR Cylinders Cast	MOTOR Valves Placed	MOTOR COOLING Water Circulation	MOTOR COOLING Radiator Core and Case	MOTOR IGNITION Type	MOTOR IGNITION Make	MOTOR IGNITION Spark Advance
Clyde.....C	3,000	1,000	134	pr-steel..	.....	solid*...	34x3½*	34x2½d*	wood-sq.	3	4-3½x4½	22.50	block...	left....	thermo.	fin-cast...	sing...	Eisemann.	fixed...
Dayton.....H	4,000	2,650	.....	rolled-c.	.....	solid....	36x4	36x3½d	wood-ov.	3	4-4½x5	29.00	pairs....	opp....	gear...	sq-t-cast...	dual..	Bosch.....	hand....
Dayton.....	7,000	3,400	.....	rolled-c.	.....	solid....	36x5	36x4d	wood-ov.	4	4-4½x6	29.00	block...	left....	cent...	fin-cast...	dual..	Bosch.....	hand....
Dayton.....K	7,000	3,400	.....	rolled-c.	.....	solid....	36x5	36x4d	wood-ov.	3	4-4½x5½	36.15	pairs....	opp....	gear...	sq-t-cast...	dual..	Bosch.....	hand....
Dayton.....M	10,000	4,500	.....	rolled-c.	.....	solid....	36x6	42x5d	wood-ov.	3	4-5½x7	44.20	pairs....	opp....	cent...	sq-t-cast...	dual..	Bosch.....	hand....
Dayton.....E	15,000	4,950	.....	rolled-c.	.....	solid....	36x7	42x6d	wood-ov.	3	4-5½x7	44.20	pairs....	opp....	cent...	sq-t-cast...	dual..	Bosch.....	hand....
Denmo.....10	2,500	1,385	124	pr-steel..	rigid....	p & s*...	34x4½*	34x4	wood-sq.	3	4-3½x5	22.50	block...	.....	thermo.	cell-sheet..	sing...	Dixie.....	.....
Diamond-T.....J5	2,000	1,485	132	pr-steel..	.....	solid....	36x3	36x4	wood-ov.	.....	4-3½x5	19.61	block...	right...	thermo.	z-z-t-sheet	sing...	Bosch.....	fixed....
Diamond-T.....J4	3,000	2,050	154*	pr-steel..	.....	solid....	36x3½	36x5	wood-ov.	.....	4-3½x5	22.50	block...	right...	cent...	z-z-t-sheet	sing...	Bosch.....	fixed....
Diamond-T.....J3	4,000	2,200	154*	pr-steel..	.....	solid....	36x4	36x6	wood-ov.	3	4-4¼x5½	27.20	block...	right...	cent...	z-z-t-sheet	sing...	Bosch.....	fixed....
Diamond-T.....L	7,000	3,300	170*	pr-steel..	.....	solid....	36x5	38x5d	wood-ov.	.....	4-4½x5½	32.40	pairs....	opp....	cent...	z-z-t-sheet	sing...	Bosch.....	hand....
Diamond-T.....R	10,000	4,200	170*	pr-steel..	.....	solid....	36x6	40x6d	wood-sq.	3	4-4½x5½	32.40	pairs....	opp....	cent...	z-z-t-sheet	sing...	Bosch.....	hand....
Duplex.....D	6,000	.....	130*	pr-steel..	flexible..	solid....	36x6	36x6	wood-sq*	3	4-4½x5	32.40	block...	right...	cent...	fin-sheet...	sing...	Eisemann*	hand....
Geneva.....1	1,500	.....	96	.....	.....	solid....	34x2	36x2½	.....	2	2-5½x4½	22.10	sing.....	head...	gear...	fin-sheet...	sing...	Simms....	fixed....
Stegeman.....	3,000	1,900	150	pr-steel..	flexible..	solid....	34x3½	36x5	wood-sq.	.....	6-3½x4½	25.39	block...	left....	cent...	sq-t-sheet.	sing...	Westghs...	auto....
Stegeman.....	5,000	2,500	144*	pr-steel..	flexible..	solid....	34x4	36x4d	wood-sq.	.....	6-3½x5½	29.45	block...	left....	cent...	fin-cast...	sing...	Westghs...	auto....
Stegeman.....	7,000	3,000	156	pr-steel..	flexible..	solid....	36x4	40x5d	wood-sq.	.....	6-3½x5½	33.75	pairs....	left....	cent...	fin-cast...	sing...	Westghs...	auto....
Stegeman.....	10,000	4,000	170	pr-steel..	flexible..	solid....	36x5	40x6d	wood-sq.	.....	6-3½x5½	33.75	pairs....	left....	cent...	fin-cast...	sing...	Westghs...	auto....
Vim.....20	1,000	635	102	pr-steel..	.....	pneu....	31x4	31x4	.....	3	4-3x4½	14.40	block...	right...	thermo.	fin-sheet...	sing...	Dixie.....	hand....

Steam Vehicles

Name and Model	Capacity in Pounds	Price of Chassis	Wheelbase in Inches	FRAME Material	FRAME Construction	TIRES Kind	TIRES SIZES IN INCHES Front	TIRES SIZES IN INCHES Rear	Wheels	BOILER Location	BOILER Type	BOILER Heating Surface in Sq. In.	BOILER Horsepower	BOILER BURNER Type	BOILER BURNER Regulation	BOILER PRESSURE Normal in Lbs.	BOILER PRESSURE Maximum in Lbs.	WATER Water Capacity in Gal.	WATER CONDENSER Type	WATER CONDENSER Circulation
Stanley.....	1,500	1,550	134	pr-steel..	semi-flx..	pneu....	34x4½	34x4½	wood-ov.	under hood	fire-tube.	14,976	20	Bunsen.	pressure.	575	625	24	cell-sheet	natural
Stanley.....	2,500	2,000	136	pr-steel..	semi-flx..	pneu....	36x5	36x5	wood-ov.	under hood	fire-tube.	22,752	30	Bunsen.	pressure.	575	625	50	cell-sheet	natural

ABBREVIATIONS: General, *, *with other options;* opt, *optional;* **Price,** -c, *complete with body.* **Frame, Material,** pr-steel, *pressed steel;* rolled-c, *rolled steel, channel section;* rolled-I, *rolled steel, I section;* **Frame Construction,** semi-flx, *semi flexible.* **Tires, kind,** Pneu, *pneumatic;* cush, *cushion,* p & s, *pneumatic front, solid, rear;* s & st, *solid rubber front, steel in rear.* **Tire Sizes,** -d, *dual.* **Wheels,** pr-steel, *pressed steel;* -ov, *oval spokes;* -sq, *square spokes;* -d, *disk or web type;* -hol, *hollow spokes;* -cr, *cruciform spokes;* -x, *cross-shaped solid spokes.* **Cylinders cast,** sing, *singly or individually.* **Location of valves,** opp, *opposite, T-head motor;* r & h, *one valve at right, the other in head, L-head motor;* l & h, *one valve at left the other in head, L-head motor.* **Water circulation,** cent, *centrifugal pump;* thermo-, *thermo-syphon or natural circulation;* gear, *gear pump.* **Radiator Type,** fin, *individually finned tubes;* sq-t, *square-tubular, resembling cellular, sometimes known as flat-tubular;* z-z-t, *zig-zag tubular, resembling cellular,* cell, *cellular or honeycomb type;* tube, *plain tubes without fins;* ring, *tubes arranged in ring about blower fan.* **Radiator Case,** -sheet, *sheet metal;* -cast, *cast metal, built up.* **Ignition Type,** sing, *single;* doub, *double,* dual-d, *dual-double.* **Make of Magneto** (or other sparking device), Conn., *Connecticut;* storage, *storage battery;* Westghs, *Westinghouse;* G & D, *Gray & Davis;* At Kent, *Atwater Kent.* **Spark Advance,** auto, *automatic;* 2-pt-fix, *two-point fixed, battery circuit in retard, magneto in advance.* **Electric System Type,** s, l & i, *starting, lighting and ignition, combination unit;* s & l, *starting and lighting, combination unit;* s & l-2, *starting and lighting, two-unit;* l & i, *lighting and ignition, combination unit.* **Electric System, Make,** Splitdf, *Splitdorf;* Al-Chal.—**(Abbreviations Continued on Opposite Page.)**

Commercial Vehicles for 1917—Continued

MOTOR										TRANSMISSION								BRAKES		CONTROL		
ELECTRIC SYSTEM			GOVERNOR			SPEED	FUEL SYSTEM				GEARSET											
Type	Make	Extra Cost	Type	Drive	Make	Motor in r. p. m.	Truck in m. p. h.	Carbureter Make	Fuel Feed	Tank Location	Clutch Type	Type	Location	Sp'ds	Total Gear Reduction in High	Final Drive	Propulsion Taken By	Torque Taken By	Hand	Foot	Steer	Levers	Name and Model
none			cent	motor	own	1,050	15	H & N	grav	seat	cone	selec	unit-m	4	8.50–1	ext-g	springs	springs	ext-sht	ext-r-w	left	cent	Walter C
none			cent	motor	own	1,000	15	H & N	grav	seat	cone	selec	unit-m	4	7.85–1	ext-g	springs	springs	ext-sht	int-r-w	left	cent	Walter B
			cent	motor	Pierce	1,100	11	Zenith	grav	seat	dry-d	selec	unit-m	4	10.30–1	worm	rad-rd	springs	int-r-w	int-r-w	right	cent	Watson, Tractor
s&l		extra			none			own	grav	seat	wet-p	selec	amid	4		bevel	rad-rd	springs	int-r-w	ext-r-w	left	c & l	White GBBE
s&l		extra			none			own	grav	seat	wet-p	selec	amid	4		db-red	rad-rd	springs	int-r-w	ext-r-w	left	c & l	White TBC
					none			own	grav	seat	wet-p	selec	amid	4		dbl chn	rad-rd		int-r-w	ext-j-s	left	c & l	White TAD
					none			own	grav	seat	wet-p	selec	amid	4		dbl chn	rad-rd		int-r-w	ext-j-s	left	c & l	White TCD
s&l-2	Westghs	125.00			none			Stmbg	grav	seat	cone	selec	unit-j	3	7.32–1	dbl chn	rad-rd		int-r-w	int-sht	right	cent	Wichita A
s&l-2	Westghs	125.00			none			Stmbg	grav	seat	cone	selec	amid	3	7.80–1	worm	springs	springs	int-r-w	int-r-w	right	cent	Wichita K
s&l-2	Westghs	125.00			none			Stmbg	grav	seat	cone	selec	amid	3	8.66–1	worm-r	springs	springs	ext-r-w	int-r-w	right	cent	Wichita L
s&l-2	Westghs	125.00			none			Stmbg	grav	seat	cone	selec	unit-j	3	8.24–1	dbl chn	rad-rd		int-r-w	int-sht	right	cent	Wichita B
s&l-2	Westghs	125.00	cent	motor	Wauk'a	1,060	13	Stmbg	grav	seat	cone	selec	amid	3	8.75–1	worm	springs	springs	int-r-w	int-r-w	right	cent	Wichita R
s&l-2	Westghs	150.00	cent	motor	Wauk'a	1,200	11	Stmbg	grav	seat	cone	selec	amid	3	11.75–1	worm	springs	springs	int-r-w	int-r-w	right	cent	Wichita O
s&l-2	Westghs	150.00	cent	motor	Wauk'a	940	9	Stmbg	grav	seat	cone	selec	amid	3	11.75–1	worm	springs	springs	int-r-w	int-r-w	right	cent	Wichita Q
lighting		stock	cent	motor	Pierce	1,200	18	Ray*	grav	seat	dry-d	selec	unit-m	3	6.50–1	worm	springs	springs	int-r-w	int-r-w	left	cent	Wilcox S
lighting		stock	cent	motor	Pierce	1,100	16	Ray*	grav	seat	cone	selec	amid	3	7.70–1	worm	springs	springs	int-r-w	int-r-w	left	cent	Wilcox R
lighting		stock	cent	motor	Pierce	1,100	14	Ray*	grav	seat	cone	selec	amid	3	8.60–1	worm	springs	springs	int-r-w	int-r-w	left	cent	Wilcox Q
lighting		stock	cent	motor	Pierce	1,100	10	Ray*	grav	seat	cone	selec	amid	3	11.70–1	worm	springs	springs	int-r-w	int-r-w	left	cent	Wilcox P
			cent	motor	Pierce	1,050	15	Marvel	grav	seat	cone	selec	amid	3	8.60–1	worm	springs	springs	int-r-w	int-r-w	left	cent	Wilson E
			cent	motor	Pierce			Zenith	grav	seat	dry-d	selec	unit-m	3		worm	springs	springs	int-r-w	int-r-w	left	cent	Witt Will WD16
			cent	motor	Pierce			Zenith	grav	seat	dry-d	selec	unit-m	3		worm	springs	springs	int-r-w	int-r-w	left	cent	Witt Will WD16
			cent	motor	Wauk'a	1,200	15	Master	grav	seat	dry-d	selec	unit-m	3	7.75–1	worm	springs	springs	int-r-w	int-r-w	left	cent	Wisconsin B
			cent	motor	Wauk'a	1,100	14	Master	grav	seat	dry-d	selec	unit-m	3	8.75–1	worm	springs	springs	int	int	left	cent	Wisconsin C
								Zenith	grav	seat	wet-d		unit-m	3		worm-4	springs	springs	int	int	left	cent	W. S. 4
l&i*	Vesta	stock	cent	duplex	Duplex	1,200	16	Stmbg	vac	seat	dry-p	ind-c	unit-m	3	7.75–1	worm	springs	springs	int-r-w	ext-r-w	left	cent	Zeitler & Lamson
l&i*	Vesta	stock	cent	duplex	Duplex	1,200	14	Stmbg	vac	seat	dry-p	ind-c	unit-m	3	8.75–1	worm	springs	springs	int-r-w	int-r-w	left	cent	Zeitler & Lamson
l&i*	Vesta	stock	cent	duplex	Duplex	1,200	12	Stmbg	vac	seat	dry-p	ind-c	amid	3	11.75–1	worm	springs	springs	int-r-w	int-r-w	left	cent	Zeitler & Lamson
l&i*	Vesta	stock	cent	duplex	Duplex	1,200	10	Stmbg	vac	seat	dry-p	ind-c	amid	3	11.75–1	worm	springs	springs	int-r-w	int-r-w	left	cent	Zeitler & Lamson

Received Too Late to Classify

									grav	dash	wet-p	selec	unit-m	3		int-gear	springs	springs	int-r.w	ext-r-w	left	cent	Clyde C
								Stmbg	grav	seat	wet-d	selec	unit-j	3		dbl chn	rad-rd		int-r-w	ext-j-s	left	cent	Dayton H
								Stmbg	grav		dry-p	selec	axid	3		worm	rad-rd	t-arm	int-r-w	int-r-w	left	cent	Dayton
								Stmbg	grav	seat	wet-d	selec	unit-j	3		dbl chn	rad-rd		int-r-w	ext-j-s	left	cent	Dayton K
								Stmbg	grav		wet-d	selec	unit-j	3		dbl chn	rad-rd		int-r-w	ext-j-s	left	cent	Dayton M
								Stmbg	grav		wet-d	selec	unit-j	3		dbl chn	rad-rd		int-r-w	ext-j-s	left	cent	Dayton E
s&l-2	Spl-App	stock	cent	d-shaft	Pierce		20	Stewart	grav	seat	dry-p	selec	unit-m	3		int-g	springs	springs	ext-r-w	int-r-w	left	cent	Denmo 10
						1,300	18	Ray	grav	seat	dry-d	selec	unit-m	3	7.75–1	worm	springs	springs	int-r-w	int-r-w	left	cent	Diamond-T J5
						1,250	16	Ray	grav	seat	dry-d	selec	unit-m	3	7.75–1	worm	springs	springs	int-r-w	int-r-w	left	cent	Diamond-T J4
			cent	motor	Pierce	1,100	15	Ray	grav	seat	dry-d	selec	unit-m	3	7.75–1	worm	springs	springs	int-r-w	int-r-w	right	cent	Diamond-T J3
			suct	motor	Mon'rch	775	12	Ray	grav	seat	dry-d	selec	unit-m	4	6.88–1	worm	rad-rd	springs	int-r-w	int-r-w	right	cent	Diamond-T L
			suct	motor	Mon'rch			Ray	grav		dry-d	selec	amid	4	13.66–1	worm	rad-rd	springs	int	int	right	cent	Diamond-T R
s,l&i		150.00	cent	duplex	Duplex	940	12	Scheb	vac		dry-d	selec	unit-m	6	12.00–1	int-g-4	rad-rd	t-arm	ext-sht	ext-sht	left	cent	Duplex D
							18	Scheb			dry-p	plan	unit-j	2		dbl chn	rad-rd				right	right	Geneva 1
s&l-2	Westghs	stock	cent	motor	Pierce	1,100	18	Stmbg	grav	seat	dry-d	selec	unit-m	3	7.75–1	worm	springs	springs	int-shft	int-r-w	left	c & l	Stegeman
s&l-2	Westghs	stock	cent	motor	Pierce	1,100	15	Stmbg	grav	seat	dry-d	selec	unit-m	3	9.25–1	worm	springs	springs	int-shft	int-r-w	left	c & l	Stegeman
s&l-2	Westghs	stock	cent	motor	Pierce	1,100	12	Stmbg	grav	seat	dry-d	selec	unit-m	3	10.33–1	worm	springs	springs	int-shft	int-r-w	left	c & l	Stegeman
s&l-2	Westghs	stock	cent	motor	Pierce	1,100	10	Stmbg	grav	seat	dry-d	selec	unit-m	3	11.00–1	worm	springs	springs	int-shft	int-r-w	left	c & l	Stegeman
							25	Zenith			cone	selec	unit-m	3	4.50–1	bevel	springs	springs			left		Vim 20

Steam Vehicles

SYSTEM		ENGINE							TRANSMISSION					CONTROL					Name and Model
Feed Pump Type	Feed Control	Location	No. of Cylinders	Cylinders Cast	Valve Location	Valve Action	Valve Stroke	Reverses By	Final Drive	Gear-Ratio	Axle Type	Propulsion Taken By	Torque Taken By	Throttle	Hook-up	Reverse	Steering Wheel Location	Brake Lever Location	
plunger	by-pass	unit-x	2	block	btw cyls	Stephenson	adj	links	spur-g	2 1/2–1	non-fl	rad-rd	t-arm	lever	pedal	pedal	left	left	Stanley
plunger	by-pass	unit-x	2	block	btw cyls	Stephenson	adj	links	spur-g	2–1	non-fl	rad-rd	t-arm	lever	pedal	pedal	left	left	Stanley

ABBREVIATIONS: (continued).—*Allis-Chalmers*; G & D, *Gray & Davis*; Westghs, *Westinghouse*; N-East, *Northeast*; Huff-S, *Huff-Simms*; Spl-App, *Splitdorf-Apple*. **Governor Type** cent, c't, *centrifugal*; suct, *suction or gas velocity*; l-b, *loose-ball*; hydr, *hydraulic*. **Governor Drive** motor, *from motor*; d-shft, *from driveshaft*; duplex, *from both motor and driveshaft or front wheel*; f-wheel, f-whl, *from front wheel*. **Governor Make** Wauk'a, *Waukesha*; Mon'rch, Mon, *Monarch*; Her-Sp, *Herschell-Spillman*; Milwkee, *Milwaukee*. **Carbureter Make,** Scheb, *Schebler*; Ray, *Rayfield*; Stmbg, *Stromberg*; Shkspr, *Shakespeare*; Flech, *Flechter*; Zen, *Zenith*, Johns, *Johnson*. **Fuel Feed,** grav, *gravity*; vac, *vacuum*; pres, *pressure*. **Tank Location,** seat, *under seat*; dash, *in dash*; rear, *at rear*; r-bd, *on running-board*. **Clutch Type,** dry-d, *dry multiple disk*; dry-p, *dry plate:* wet-d, *multiple-disk in oil*; wet-p, *plate-in-oil*. **Gearset Type,** selec, *selective sliding gear*; prog, *progressive sliding gear*; ind-c, *individual clutch, constant-mesh*; plan, *planetary*; fric, *friction*; elec, *electric*. **Gearset Location,** amid, *amidships*; unit-m, *unit with motor*; unit-j, *unit with jackshaft*; unit-x, *unit with axle*. **Final Drive,** int-g, *internal-gear*; worm, *top worm*; dbl chn, *double side chains*; sp-bevel, *spiral bevel*; db-red, *double-reduction, bevel and spur gears*; ext-g, *external-gear*; -f, *to front wheels*; -4, *on all four wheels*. **Propulsion Taken By,** rad-rd, *radius rods*; tor-t, *torsion-tube*; sub-f, *sub-frame*; spg's, *springs*. **Torque Taken By,** rad-rd, *radius rods*; tor-t, *torsion-tube*; t-arm, *torque-arm*; sub-f, *sub-frame*; sp'gs, *springs*. **Brakes, Type,** ext, ex, *external contracting*; int, *internal expanding*. **Brake Location,** -r-w, *rear wheel*: -sht, *shaft*; -f-w, *front wheel*; -j-s, *jackshaft*; -4-w, *on all four wheels*. **Control, Levers,** cent, *center*; c & r, *gearshift center, brake right*; c & l, *gearshift center, brake left*.

Technical Specifications of 37 Electric Trucks on The American Market

Name and Model	Load Capacity in Pounds	PRICE OF CHASSIS: With Battery	PRICE OF CHASSIS: Without Battery	Wheelbase in Inches	TIRES: Kind	TIRES: SIZES IN INCHES: Front	TIRES: SIZES IN INCHES: Rear	BATTERY: Location	BATTERY: Make and Type	BATTERY: No. Plates	BATTERY: No. Cells	BATTERY: No. Trays	BATTERY: Amp.-Hr. Capacity	BATTERY: MILES PER CHARGE: Light	BATTERY: MILES PER CHARGE: Loaded	MOTOR: Location and Number	MOTOR: Make
Atlantic 1-C	2,000			103	solid	34x3½	36x4	amid-u	optional							amid-1	G.E.
Atlantic 2-C	4,000			115½	solid	34x4	36x3d	amid-u	optional							amid-1	G.E.
Atlantic 3-C	7,000			135	solid	36x5	40x4d	amid-u	optional							amid-1	G.E.
Atlantic 5-C	10,000			144	solid	36x6	40x5d	amid-u	optional							amid-1	G.E.
C.T.	1,000	1,925*	1,500	90	solid	36x3	36x3	amid-u	Philadelphia*	13*	42*		153*		60*†	unit-x-2	G.E.
C.T.	2,000	2,330*	1,800	100	solid	36x3½	36x4	amid-u	Philadelphia*	17*	42*	5*	204*		60*†	unit-x-2	G.E.
C.T.	4,000	2,850*	2,200	116	solid	36x5	36x3½d	amid-u	Philadelphia*	21*	42*	6*	225*		60*†	unit-x-2	G.E.
C.T.	7,000	3,910*	3,100	115	solid	36x3½d	36x4d	amid-u	Philadelphia*	27*	42*	6*	331*		50*†	unit-x-4	G.E.
C.T.	10,000	4,425*	3,500	132	solid	36x4d	36x5d	amid-u	Philadelphia*	31*	42*	9*	382*		50*†	unit-x-4	G.E.
Couple-Gear H	7,000	4,200	3,500	96*	solid	36x4d	36x4d	amid-u	U. S. L.*	23*	44*	6*	280*	40*	30*	in wheel-4	C-G
Couple-Gear AF	10,000	3,900	3,100	100*	s & st	36x5d	64x5½	amid-u	U. S. L.*	27*	44*	6*	330*	35*	25*	in wheel-2	C-G
Couple-Gear A	10,000	4,650	3,900	96*	solid	36x5d	36x5d	amid-u	U. S. L.*	27*	44*	6*	330*	40*	30*	in wheel-4	C-G
Couple-Gear SD	14,000	5,250	4,400	96*	solid	36x6d	36x6d	amid-u	U. S. L.*	33*	44*	6*	400*	40*	30*	in wheel-4	C-G
G.V.	1,000			89	solid	36x2½	36x2½	amid-u	Exide-Ir*	9*	44*	4*	133*		45*†	in rear-1	G.E.
G.V.	2,000			104	solid	36x3½	36x3½	amid-u	Exide-Ir*	11*	44*	5*	169*		45*†	in rear-1	G.E.
G.V.	4,000			112½*	solid	36x4	36x3d	amid-u	Exide-Ir*	15*	44*	6*	227*		45*†	in rear-1	G.E.
G.V.	7,000			132½*	solid	36x6	36x4d	amid-u	Exide-Ir*	17*	44*	6*	268*		40*†	in rear-1	G.E.
G.V.	10,000			141½*	solid	36x7	36x5d	amid-u	Exide-Ir*	19*	44	6*	298*		35*†	in rear-1	G.E.
Lansden S	750	1,850	1,175	90	cush	34x3	34x4	u-seat	Edison-A4		60	10			60	unit-x-1	G.E.
Lansden M	1,000	2,310	1,500	90	solid	36x2½	36x3	amid-u	Edison-A4		60	10			60	unit-j-1	G.E.
Lansden M	2,000	2,900	1,700	106	solid	36x3	36x3½	amid-u	Edison-A6		60	10			60	unit-j-1	G.E.
Lansden M	4,000	3,660	2,100	120	solid	36x4	36x3d	amid-u	Edison-A8		60	10			50	unit-j-1	G.E.
Lansden M	7,000	4,455	2,475	130	solid	36x5	36x4d	amid-u	Edison-A10		60	10			50	unit-j-1	G.E.
Lansden M	10,000	5,190	2,850	142	solid	36x6	36x5d		Edison-A12		60	10			50	unit-j-1	G.E.
Lansden Tractor	20,000	3,660	2,100	58	solid	30x4	30x5	amid-o	Edison-A8		60	10			60	rear-1	G.E.
Walker M	1,000			90*	solid	34x3	36x3½	amid-u	Edison*		60*				75*	unit-x-1	West.
Walker K	2,000			92*	solid	34x3	36x4	amid-u	Edison*		60*				75*	unit-x-1	West.
Walker L	4,000			107*	solid	38x4	38x6	amid-u	Edison*		60*				65*	unit-x-1	West.
Walker D	6,000			126*	solid	36x5	38x4d	amid-u	Edison*		60*				60*	unit-x-1	West.
Walker E	8,000			130*	solid	36x6	38x5d	amid-u	Edison*		60*				60*	unit-x-1	West.
Walker N	10,000			136*	solid	36x7	38x6d	amid-o	Edison*		60*				50*	unit-x-1	West.
Ward WS	750	760		88	solid	32x2½	32x2½	u-seat	Ward*		42*	3*	100*		35*	amid-1	West.
Ward EO	1,000	1,250		90	solid	32x2½	34x6	amid-u	Ward*		42*	3*	127*		45*	amid-1	West.
Ward EA	2,000	1,500		99	solid	34x3	36x4	amid-u	Ward*		42*	3*	153*		40*	amid-1	West.
Ward EB	4,000	1,900		111	solid	36x4	38x6	amid-u	Ward*		42*	3*	204*		35*	amid-1	West.
Ward EC	7,000	2,450		132	solid	38x6	40x3½d	amid-u	Ward*		42*	3*	280*		30*	amid-1	West.
Ward ED	10,000	2,950		152	solid	40x3½d	42x5d	amid-u	Ward*		42*	3*	357*		25*	amid-1	West.

ABBREVIATIONS: General, *, *with other options;* opt, *optional.* **Tires, Kind,** cush, *cushion;* s & st, *solid in front and steel in rear.* **Tire Sizes,** d, *dual.* **Battery Location** amid-u, *amidships, underslung below frame;* front-o, *at front, over frame;* amid-o, *amidships over frame;* rear-o, *at rear, over frame;* u-hood, *under hood;* u-hood-r, under *hood in rear;* front-u, *in front, under frame;* u-seat, *under seat;* **Battery, Make and Type,** Exide-Ir, *Exide-Ironclad type.* **Miles per Charge, Loaded,** †, *half way light, half loaded.* **Motor, Location and Number,** amid, *amidships;* unit-j, *unit with jackshaft;* unit-x, *unit with axle.* Numbers following *refer to number of motors in chassis.*

Battery Service Widens

ONE of the most important developments in the electrical vehicle industry during the past year is the development of battery service systems, or as they are sometimes called, battery exchange systems. This has greatly widened the field of the electric truck and increased its efficiency in installations of one, two or three vehicles.

The system is based on the principle that it is more economical to maintain an electric truck as one of a fleet of many than as an individual vehicle. Various forms of the system are now in use in more than ten cities throughout the United States. The system's greater development in 1916 has proved one of the most far-reaching steps in the advancement of the electric truck industry during the year, and has increased the sales of trucks wherever introduced.

The larger use of battery service has occasioned a greater degree of co-operation between truck user, truck manufacturer and the central station interests who have supplied the current for the battery charging.

Detachable Battery Cradle

The system in brief consists of the purchase of an electric truckless battery, the vehicle being supplied with a specially-designed detachable battery cradle. By the use of this interchangeable cradle the company furnishing the power is enabled to exchange a discharged or partly-discharged battery for a fully-charged one in from 2 to 5 min.

The current used is sold by the mile, according to the size of the vehicle and the amount of mileage as recorded by the odometer. An additional fixed sum is charged for the battery service and inspection, and a third fixed charge if the vehicle is garaged at the point where the batteries are exchanged. Both of these latter charges are fixed for any particular size of vehicle, although of course they are graded according to the truck capacity and the rate for current decreases as the mileage increases.

For the user, the battery service system eliminates practically all of the objections which have formerly mitigated against the more general use of the electric as compared with the gasoline truck. These objections included: A high initial cost of vehicle; uncertainty in the small user's mind as to the efficiency and life of the battery and the trouble of its care and that of the charging apparatus necessary; the limited mileage on one charge of the battery and the uncertainty as to the actual cost of truck operation.

Commercial Vehicle Chassis Listed on for the 1917 Season

MOTOR					CONTROLLER			DRIVE						SPRINGS		CONTROL		
Winding	Horse-power	Voltage	SPEED IN MILES PER HOUR		Location	SPEEDS		GEARING		Total Gear-Ratio	Torque Taken By	Propul-sion Taken By		Front	Rear	Steer	Con-troller Lever	Name and Model
			Light	Loaded		Ahead	Reverse	First Reduc-tion	Final Reduc-tion									
series	2.6	85*	12	10	u-seat	4	2	s-chain	dbl chn	10.82-1		rad-rd		½-ell	½-ell	wheel-l	l-seat	Atlantic 1-C
series	2.6	85*	11	9	u-seat	4	2	s-hcain	dbl chn	10.82-1		rad-rd		½-ell	½-ell	wheel-l	l-seat	Atlantic 2-C
series	3.9	85*	10	8	u-seat	4	2	s-chain	dbl chn	9.95-1		rad-rd		½-ell	½-ell	wheel-l	l-seat	Atlantic 3-C
series	6.0	85*	9	7	u-seat	4	2	s-chain	dbl chn	13.48-1		rad-rd		½-ell	½-ell	wheel-l	l-seat	Atlantic 5-C
series	2.5	85*	15	13½	st-col	4	2	spur-gear	spur-gear	10.00-1	rad-rd	rad-rd		½-ell	½-ell	wheel-l	u-wheel	C.T
series	3.2	85*	14	12	st-col	4	2	spur-gear	spur-gear	11.50-1	rad-rd	rad-rd		½-ell	½-ell	wheel-l	u-wheel	C.T
series	5.0	85*•	12	10	st-col	4	2	spur-gear	spur-gear	12.14-1	rad-rd	rad-rd		½-ell	½-ell	wheel-l	u-wheel	C.T
series	7.0	85*	11	9	st-col	4	2	spur-gear	spur-gear	17.32-1	rad-rd	rad-rd		½-ell	½-ell	wheel-l	u-wheel	C.T
series	7.0	85*	9	7	st-col	4	2	spur-gear	spur-gear	20.14-1	rad-rd	rad-rd		½-ell	½-ell	wheel-l	u-wheel	C.T
series	12	88	12	9	btw seats	5	5	direct	bevel	25.00-1	rad-rd	rad-rd		½-ell	½-ell	wheel-r	btw seats	Couple-Gear H
series	10	88	9	7	btw seats	5	5	direct	bevel	25.00-1	rad-rd	rad-rd		½-ell	½-ell	wheel-r	btw seats	Couple-Gear AF
series	12	88	10	8	btw seats	5	5	direct	bevel	25.00-1	rad-rd	rad-rd		½-ell	½-ell	wheel-r	btw seats	Couple-Gear A
series	20	88	10	8	btw seats	5	5	direct	bevel	25.00-1	rad-rd	rad-rd		½-ell	½-ell	wheel-r	btw seats	Couple-Gear SD
series	2.5	85*	13½	12	u-seat	5	2	s-chain	dbl chn	10.2-1	springs	rad-rd		½-ell	½-ell	wheel-l	l-seat	G.V
series	3.4	85*	11½	10	u-seat	5	2	s-chain	dbl chn	10.76-1	springs	rad-rd		½-ell	½-ell	wheel-l	l-seat	G.V
series	4.6	85*	10½	9	u-seat	5	2	s-chain	dbl chn	11.61-1	springs	rad-rd		½-ell	½-ell	wheel-l	l-seat	G.V
series	5.6	85*	9½	8	u-seat	5	2	s-chain	dbl chn	13.95-1	springs	rad-rd		½-ell	½-ell	wheel-l	l-seat	G.V
series	6.8	85*	8½	7	u-seat	5	2	s-chain	dbl chn	13.95-1	spriigs	rad-rd		½-ell	½-ell	wheel-l	l-seat	G.V
series		60		15	u-hood	4	2	spur-gear	bevel	12.00-1	t-arm	springs		½-ell	½-ell	wheel-l	u-wheel	Lansden S
series		60		12	u-hood	4	2	bevel	dbl chn	8.00-1		rad-rd		½-ell	½-ell	wheel-l	u-wheel	Lansden M
series		60		10	u-hood	4	2	bevel	dbl chn	10.00-1		rad-rd		½-ell	½-ell	wheel-l	u-wheel	Lansden M
series		60		9	u-hood	4	2	bevel	dbl chn	13.00-1		rad-rd		½-ell	½-ell	wheel-l	u-wheel	Lansden M
series		60		7	u-hood	4	2	bevel	dbl chn	13.00-1		rad-rd		½-ell	½-ell	wheel-l	u-wheel	Lansden M
		60		6	u-hood	4	2	bevel	dbl chn	14.50-1		rad-rd		½-ell	½-ell	wheel-l	u-wheel	Lansden M
series		60	8	5	u-seat	4	2	s-chain	dbl chn	9.00-1		rad-rd		½-ell	½-ell	wheel-l	u-wheel	Lansden Tractor
series	3.0	60*	17	15	u-seat	5	5	direct	plan	16.87-1	springs	springs		½-ell	½-ell	wheel-l	l-seat	Walker M
series	3.5	60*	16	14	u-seat	5	5	direct	plan	16.87-1	springs	springs		½-ell	½-ell	wheel-l	l-seat	Walker K
series	4.0	60*	16	14	u-seat	5	5	direct	plan	16.14-1	springs	springs		½-ell	½-ell	wheel-l	l-seat	Walker L
series	5.0	60*	13	12	u-seat	5	5	direct	plan	15.57-1	springs	springs		½-ell	½-ell	wheel-l	l-seat	Walker D
series	6.0	60*	12	11	u-seat	5	5	direct	plan	15.57-1	springs	springs		½-ell	½-ell	wheel-l	l-seat	Walker E
series	6.5	60*	12	10	u-seat	5	5	direct	plan	18.83-1	springs	springs		½-ell	½-ell	wheel-l	l-seat	Walker N
series	2					4		direct	sp-bev					½-ell	½-ell	wheel-l	u-wheel	Ward WS
series						4		chain	dbl chn					½-ell	½-ell	wheel-l	l-seat	Ward EO
series						4		chain	dbl chn					½-ell	½-ell	wheel-l	l-seat	Ward EA
series						4		chain	dbl chn					½-ell	½-ell	wheel-l	l-seat	Ward EB
series						4		chain	dbl chn					½-ell	½-ell	wheel-l	l-seat	Ward EC
series						4		chain	dbl chn					½-ell	½-ell	wheel-l	l-seat	Ward ED

ABBREVIATIONS: (continued). **Controller, Location,** u-seat, *under seat:* st-col, *on steering column:* u-plat, *under platform:* u-hood, *under hood:* btw seats, *between seats.* **Drive, Gearing, First Reduction,** chain, *silent chain.* **Final Reduction,** dbl chn, *double chain;* sp-bev, *spiral bevel gears;* plan, *planetary gears;* -f, *to front wheels;* -4, *to all four wheels.* **Torque Taken By,** t-arm; *torque arm;* sub-f, *sub-frame;* pdstl, *pedestal:* rad-rd, *radius rods.* **Propulsion Taken By,** rad-rd, *radius rods:* sub-f, *sub-frame;* pdstl, *pedestal.* **Springs,** ¼-ell, *one-quarter elliptic;* ½-ell, *half-elliptic;* ¾-ell, *three-quarters-elliptic;* trans-x-*transverse X shape or reversed elliptic.* **Control, Steer** -l, *to the left;* -r, *to the right:* -c, *in the center.* **Controller Lever,** u-wheel, *under steering wheel;* l-seat, *to left of seat;* r-seat, *to right of seat:* btw seats, *between seats,* cent, *center;* l-plat, *to left of platform.*

Electric Truck Scope

All of these objections have been overcome by the battery service plan in which the user does not buy, own or care for the batteries, but concerns himself only with the actual operation of the trucks. Without batteries the prices of the trucks are reduced anywhere from 20 to 38 per cent. In addition, the exchange battery feature of the system eliminates the limitations of battery mileage and enables the truck owner to operate his vehicle 24 hr. daily if he so desires by simply changing the batteries as fast as they become exhausted. As the charges for the battery service and inspection are fixed no matter how many batteries are used in a day and the charge for the current consumed, based on the mileage covered, the truck owner pays in exact proportion to what he receives. Furthermore, these charges can be ascertained easily and often determined in advance.

Finally, the system offers the purchaser a substantial reduction in truck investment in addition to the elimination of charging and garage apparatus. It also offers unlimited mileage and a reduction of all battery-care costs because of the savings effected in the handling of a large instead of a small number of batteries as would be the case were the truck owner to maintain his own batteries.

The advantages of the system to the truck maker are of course obvious in that it tends to increase the sales of trucks. The advantage to the central station supplying the current is that it offers a ready means of disposing of the off-peak current.

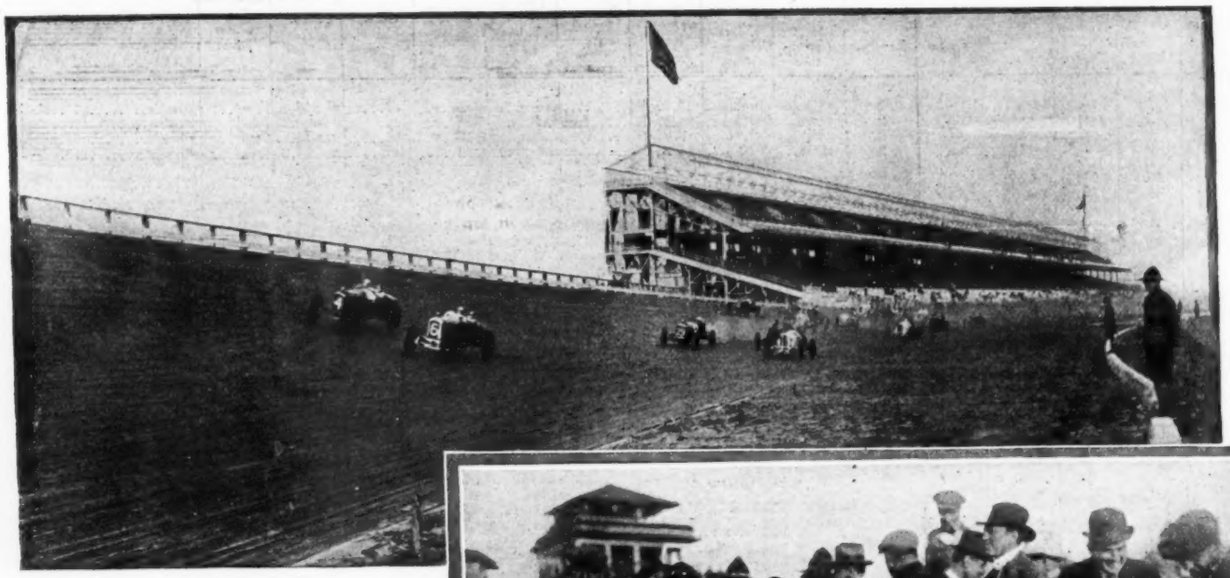
The system as outlined above is not new, the General Vehicle Co. and the Hartford Electric Light Co., Hartford, Conn., having inaugurated such a system as far back as June, 1912. Before that several department stores, mail transfer concerns, textile mills and others developed private battery exchange methods.

System Used in Many Cities

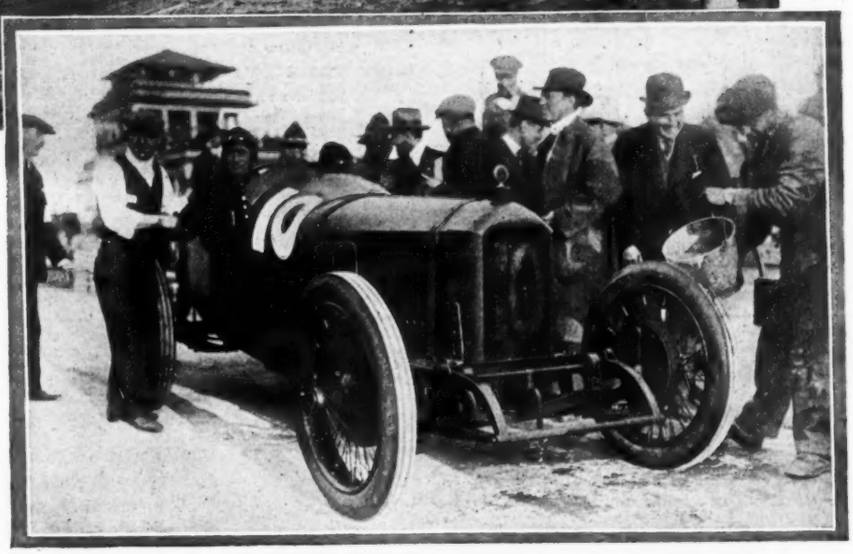
The General Vehicle Co.'s system, which is substantially that as outlined above, is now in operation in nine other cities besides Hartford, Conn., with several others pending. The cities in which vehicles are now being operated on the system include Spokane, Wash.; Boston, Mass.; Baltimore, Md.; Harrisburg, Pa.; San Francisco and Los Angeles, Cal.; Worcester and Fall River, Mass., and Wichita, Kan. In all, there are several hundred electric trucks now being operated on the Gevco or General Vehicle Co.'s system in these ten cities.

Aitken Wins Harkness Trophy Race

Peugeot Pilot Covers 100 Miles at 105.95 M. P. H., Breaking American Speedway Record—Pace 109 M. P. H., Until Resta Was Eliminated at 65 Miles



Start of the Harkness Trophy 100-mile race



Aitken at the wheel of his Peugeot after winning the Harkness Trophy race

NEW YORK CITY, Oct. 30—The old Brooklands record for 100 miles still hangs by a hair, rather to the surprise of the majority, who expected to see it beaten at Sheepshead Bay last Saturday. Actually Aitken on his Peugeot came within 7.52 sec. of the record time, and could have beaten it easily had he wished to do so, since he had been running easy from the time that his chief rival, Resta, was forced to retire, about the middle of the race.

As it was, Aitken knocked 47 sec. off his previous best time for 100 miles, made in the Astor Cup race 4 weeks ago, and worked himself back into the lead for the American speedway championship, Resta taking second place in the new ranking list..

The race was a Resta-Aitken duel. For 60 miles it was run at 109 m.p.h. with Aitken and Resta trying to outmaneuver each other at every turn of the banking. Both had to stop for tires, but both got away again so smartly that it hardly affected their relative positions. From the start to the time when the overstressed crankshaft of Resta's engine gave up the struggle Resta and Aitken had rarely been much more than a length apart.

With Resta's retirement at 65 miles, the race was over. Aitken cut down speed instantly, dropping from 109 to about 103 m.p.h., or even less, a small percentage, but enough to make a big difference in the load on his engine. Thenceforward, Aitken, Wilcox on the third Peugeot and Galvin on a Premier ran in a bunch of three with little variation, the field making some good racing among themselves a lap behind or more.

FINISHERS IN HARKNESS TROPHY RACE—100 MILES

Car	Driver	Time Hr.Min.Sec.	M.P.H.	Prize
Peugeot	Aitken*	56:37.65	105.95	$4,000
Premier	Galvin	56:45.35	105.71	2,500
Peugeot	Wilcox	57:10.53	104.9	1,500
Maxwell	Henderson	59:04.70	101.31	1,000
Duesenberg	Devore	59:05.47	101.3	600
Benedict	Benedict	59:23.88	100.9	400
Hoskins	Hughes	1:01:47. 1	98.2	....

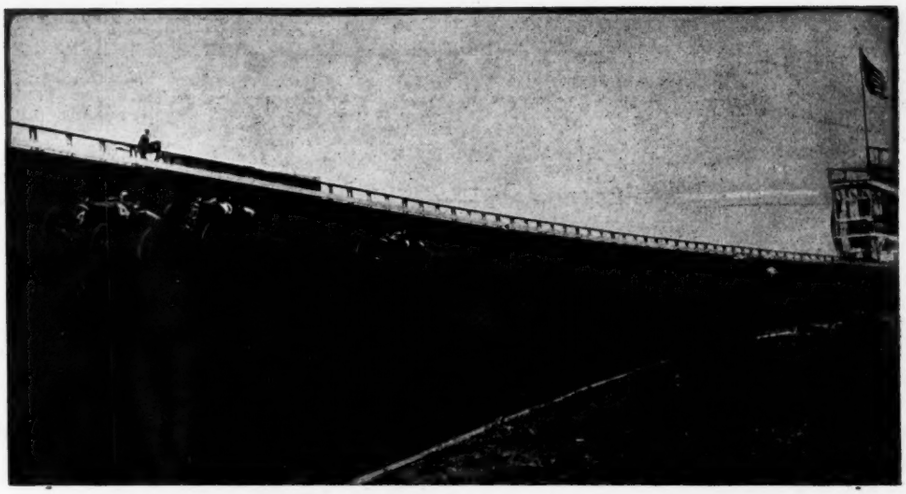
*Lap prizes, $1,400 additional; Peugeot, Resta, $1,400 lap prize.

TIMES OF FINISHERS IN 50-MILE RACE

Car	Driver	Time Hr.Min.Sec.	M.P.H.	Prize
Delage	Le Cain	28:49.59	104.2	$1,000
Duesenberg	Milton	30:15.8	99.25	600
Pugh	Meyer	30:16.36	99.1	400
Duesenberg	Devlin	30:17.11	99	300
Hoskins	Hughes	30:31.40	98.25	200
Crawford	Muller	30:32.4	98.15	....
Crawford	Klein	31:09.65	96.5	....

Possibly had there not been prizes of $50 or $100 for the leader of each lap Resta might not have set so hot a pace. He carried off the lion's share of this lap money up to the point where he went out; in short he had a two-to-one advantage over Aitken, but perhaps Aitken was as much responsible as Resta, for, drive as he would, Resta could never get a car length ahead of his rival.

Nature could offer nothing finer as a setting for so historic a conflict; the sky was the finest autumn blue, there was scarcely a breath of wind and not a cloudlet, yet the sprinkling of people through the high double-decked grandstand was pathetic. Conservatively, not 5000 saw the race from the stand. In the bleachers was a smaller number. The infield had less than 150 parked cars. It was no attendance for so great a conflict. Enthusiasm was lacking, and those outbursts of cheers that Aitken and Resta merited were lacking. When Aitken finished there was but a faint ripple, and it was not until he pulled up beside the pit after having traveled an extra lap or so for safety that the stand seemed to waken to the occasion and greeted the victor with a respectable cheer. A performance which came so near bringing a world's record to this speedway deserved more exultation. Unfortunately the stands were not well enough advised during the progress of the race, and many who might otherwise have been at fever heat were pardonably lukewarm.

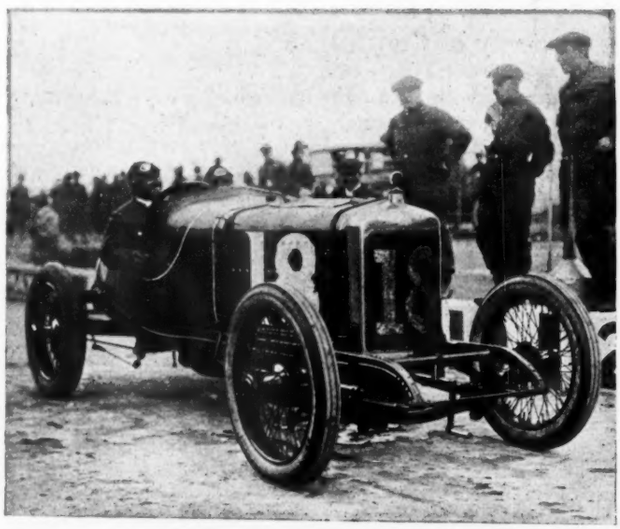


Resta's Peugeot leading Aitken and Wilcox coming out of the homestretch. The cars were as close together as this on lap after lap of the 100-mile race

LEADERS AT 10-MILE INTERVALS IN THE HARKNESS TROPHY RACE

Miles	Driver	Time Hr.Min.Sec.	M.P.H.	Prize
10	Aitken	5:39.0	106.2	$100
20	Aitken	11:05.0	108.2	100
30	Resta	16:28.35	109.3	100
40	Resta	21:52.0	109.6	100
50	Resta	27:22.0	109.5	250
60	Aitken	33:49.0	106.2	100
70	Aitken	39:33.0	104.2	100
80	Aitken	45:16.0	106	100
90	Aitken	50:54.0	106.1	250
100	Aitken	56:37.65	105.95	4,000

The intermediate laps which had prizes of $50 each were divided between Resta and Aitken, so that they took $1,400 each, Aitken making the final prize of $4,000 in addition or a total of $1,400 to Resta and a total of $5,400 to Aitken.



Devigne and his Delage, winner of the 50-mile consolation event

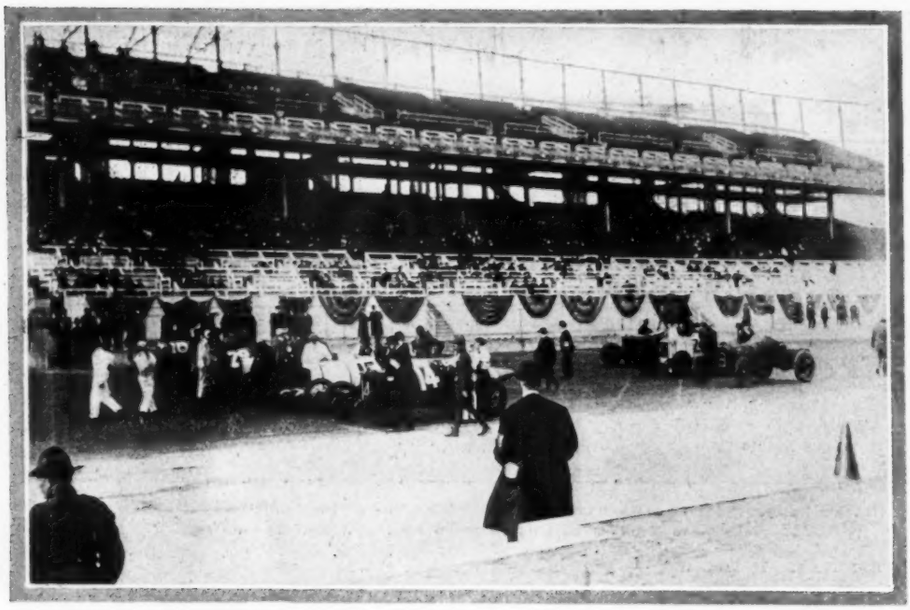
Figures best narrate the consistency of the struggle. For 30 miles the speed was over 109 m.p.h. It started at 106.2 for the first 10 miles, jumped to 108.8 at 20 miles, was 109.3 at 30 miles, rose to 109.6 at 40, varied to 109.5 at 50 and was then pulled down to 106.2 at 60, due to stops for tire changes by both Aitken and Resta. With Resta out, there was not the incentive for Aitken to continue at his previous pace, and we find the average remaining at 106.2 at 70, then dropping to 106 flat at 80, rising to 106.1 at 90 and finishing at 105.95 at the century.

Wilcox in Peugeot No. 1 and Galvin in one of the new Premiers deserve creditable mention. Galvin drove a consistent race and made no stop. Wilcox had scarcely such good fortune with his Peugeot. He had to stop at 46 miles to change a right rear. Up to that time he was always one of the first three. The order of passing the grandstand was Resta, Aitken and Wilcox, or Aitken, Resta and Wilcox. Wilcox was rarely over 100 ft. back of the leaders. His tire change was not so good as either Aitken or Resta, as he consumed 25 precious seconds, and after that he was never alongside of the leaders.

The also-rans divided the glory, four of them finishing within the money, the cash being divided over a field of seven. Maxwell, Duesenberg, Benedict and Hoskins shared the remaining positions in the order noted. With the exception of the Maxwell, the other three used Duesenberg motors, so it might be classed as a Duesenberg day in this part of the field. With the exception of the Hoskins, all averaged over 100 m.p.h. Henderson, in the Maxwell, was less than 1 sec. ahead of Devore in the Duesenberg. Unfortunately this hard-fought duel for 100 miles was lost sight of by the majority of the spectators. It was a race within a race, and staged as a separate attraction would have been a grandstand thriller from start to finish.

The tale of the unfortunates, those that started but stopped before the allotted time, embraces the names of favorites and others. Rickenbacher's Maxwell went out with a broken piston before the race was half over. He traveled up with the first group pursuing the Aitken-Resta duet. Vail's Supersix Hudson went out at 20 miles with a burned connecting-rod bearing. LeCain's Delage was out at 40 miles with valve trouble. Lewis' Premier stopped with carbureter troubles at 50 miles and did not continue. Of the other twenty-one starters the majority were running when the seven that carried off the money finished and were then flagged off the course. Of the two Crawfords, one stopped with carbureter trouble and the other was running at the finish.

To-day's race did not afford sufficient data to secure a correct estimate on how cord tires endure at a pace of 109



Start of the 50-mile consolation race for non-winners at Sheepshead Bay speedway

m.p.h. or higher. Only two definite cases are at hand, that of Aitken's right rear at 56 miles and Resta's right rear at 64 miles. It would scarcely be correct to draw deduction from these two examples. In the 250-mile Astor Cup race on this speedway a month ago Aitken did not change a tire in that distance, but he rarely traveled at an average of over 105 miles. To-day for 30 miles he averaged over 109 m.p.h., and this added 4 miles appeared to have a serious influence on tires.

One factor entered into to-day's race that was wanting 4 weeks ago, namely, that both Aitken and Resta did immeasurably more jockeying for favorable positions, and so imposed a proportionately greater strain on the tires. They rode high on the banks to gain impetus on the stretches, a practice which imposed an added strain on the cord pneumatics.

The winner's equipment included Goodyear cord tires, Miller carbureter, Rudge-Whitworth wheels, Hartford shock absorbers, K. L. G. spark plugs, Bosch magneto, and he used Oilzum.

After the 100-mile curtain was rung down there was a consolation race of 50 miles for those not finishing in the money in the big show. Eleven cars started in this race, which proved an easy victory for LeCain in the Delage, which averaged 104.2 m.p.h. for the distance. No records were broken, and it was a procession from start to finish. The race divided itself into three groups, LeCain in the first group, making a runaway of it. He lapped a goodly portion of the field at 26 miles and had the entire field a lap back of him at 44 miles. He did not have to stop, and generally was alone on the track excepting when lapping the two groups into which the field divided itself shortly after the race had really got well under way.

The first group was made up of a Crawford, driven by Klein, Milton's Duesenberg, Meyer's Pugh and Devlin's Duesenberg running a lap back.

The second bunch included Hughes' Hoskins, Vail's Hudson, which started on five cylinders and had eventually to retire, and Muller's Crawford. Both of these groups were very much slower than the winning Delage, or nearly a lap behind the record group.

Protection of cars, track and grandstand against fire was again provided by the H. W. Johns-Manville Co., which distributed a squad of twenty-five men equipped with extinguishers around the track.

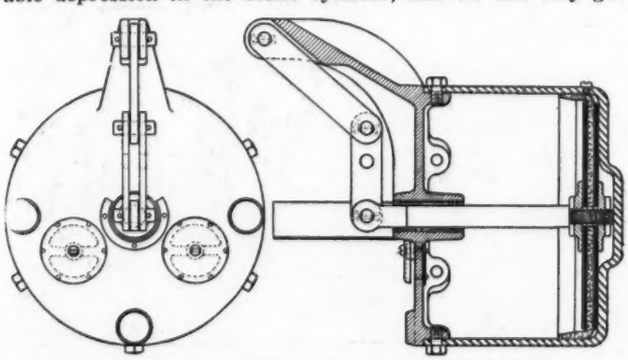
Vacuum Brake for Automobiles

System Used for Train Brakes Applied in Simple Manner to Any Car—Great Delicacy of Control

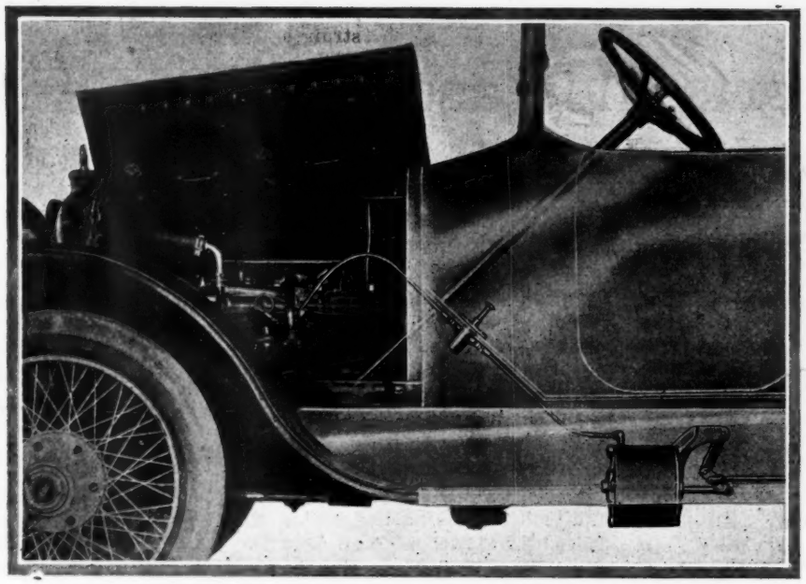
THE idea of using some form of vacuum or air brake for automobiles is not new, but the Prest-O-Lite Co., Indianapolis, Ind., has just worked out an extremely neat and simple form, this being an invention of Benjamin G. Kramer, who also was responsible for the Pierce engine governor.

The system of the brake is to utilize the suction prevailing in the intake manifolds. The few pounds per square inch difference between manifold pressure and atmospheric pressure is converted into a respectable force by the use of a large piston. It is stated that a force of about 10 lb. per square inch is available as a rule, and this is used on a piston of 7 in. diameter with an available stroke of 4 in. A system of levers reduces the travel and multiplies the force correspondingly, so that a powerful pull on the brake operating rod is obtained.

A simple little valve is placed in the pipe line connecting the intake manifold with the brake piston, and this valve can be operated either by foot or by hand, the way in which this valve permits the brakes to be applied with different degrees of intensity being extremely ingenious. To give different amounts of pull on the brake rod it is necessary to have variable depression in the brake cylinder, and we can only get



Section through the vacuum cylinder of the Prest-O-Lite brake



Shows how the Prest-O-Lite brake control is fitted to a car

this by opening the connection to the manifold, allowing a little air to be sucked out and then closing the valve again quickly, otherwise the full suction will come on at once.

This would be a delicate hand operation, so it is made automatic by the valve. The valve is opened by pressing down on a spring which in turn presses on the valve. The lower side of the valve is exposed to atmospheric pressure continuously and the upper side of the valve is exposed to the pressure existing within the brake cylinder. Thus, when the valve operating lever is moved, it presses on the spring and opens the valve. Instantly the pressure back of the valve drops, and the atmospheric pressure on the other side of the valve forces it up against the spring, so cutting off the suction. In this way the depression in the brake cylinder is made proportional to the amount of movement given to the valve operating lever or pedal. Directly the operating lever is released the valve is lifted right back and this admits atmospheric pressure to the cylinder, thus releasing the brake instantly.

The cylinder is very similar to the air-brake cylinders used in braking railroad trains. With a pressed steel shell and a cast steel head, the entire cylinder weighs in the neighborhood of 12 lb. The thin steel piston embodies a leather plunger, a duplicate in design of the type used in locomotive air-brake cylinders, which have been known to give 7 years' service before replacement was necessary.

A representative of THE AUTOMOBILE drove a Packard twin six and a Velie, the former equipped with a hand operated brake and the latter with a pedal. In ordinary driving, through traffic and over hilly country roads the flexibility of the brake could not be questioned. The Packard was put up to 35 m.p.h., the brake lever applied—with a touch of the little finger—and the rear wheels locked, both of them, so that the car slid in a straight path up the road. With one of the brakes thrown out of adjustment, it was again found possible to lock both wheels evenly, as the extreme pressure possible took up the difference through the equalizers. Then again, driving at any speed, it was possible by a shorter movement of the lever to give the brakes the very slightest touch so that their effect was hardly noticeable. Any degree of pressure between these two was easily obtainable.

The brake will operate with enough force to slip the wheels as long as the engine is turning over. As an example of this the Packard was driven by the starting motor alone, meaning that the car was traveling possibly ½ m.p.h., yet full application of the brake lever locked the wheels. It might be noted here that the brakes on the Packard were so set that in order to slip the wheels, it was necessary to throw the entire weight on the regular brake pedal which was connected to the same levers. In descending steep declines where it is possibly advisable to turn off the ignition and leave the clutch engaged, the brake will operate as efficiently as it will with the engine under power.

In the pedal operation as applied to the Velie, driving through crowded traffic was a revelation. The pedal was located directly beside the accelerator. Through the most crowded traffic operation of the car was simply a matter of oscillating the foot from the accelerator to the brake pedal and vice versa, about the same amount of foot pressure being required to operate both. The car was driven into a steep ditch, the brake applied with the foot, a shift made into reverse, the foot switched from the brake pedal to the accelerator and the car slid out without difficulty.

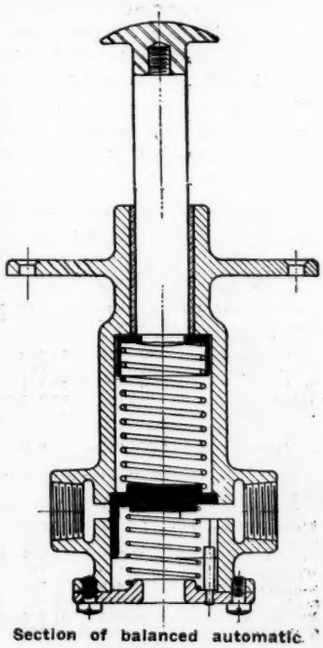
The release is almost instantaneous, so rapid in fact that it is impossible to shift the foot from the brake pedal to the accelerator quick enough to catch the brakes unreleased.

Tight connections are unnecessary. As a matter of demonstration, a system was connected up with each union turned in place with the fingers only. To aggravate conditions a pipe was inserted between the valve and the manifold, which was drilled through. Still the device worked perfectly.

To Fit All Cars

The vacuum brake will be marketed with a view of furnishing brackets for attachment for all well-known makes of cars, both as a factory equipment and retailing proposition. Although it was primarily designed for passenger car use, particular emphasis is laid on its merits as a part of truck equipment, especially in very heavy trucks where it is difficult to create sufficient leverage with a foot-operated brake acting on the rear wheels.

This invention appears to be one that may easily rank in importance with the vacuum fuel feed system. The name of the Prest-O-Lite company is sufficient to guarantee that the device has been tried out with requisite thoroughness and found free from faults and its cost, though obviously greater than that of a plain pedal or brake lever ought not to be prohibitive where quantities are required. Practically the only wearing portions of the whole outfit are the cup leathers, and we know from experience of other machinery that these will last an immense time when protected and lubricated.



Section of balanced automatic control valve

It would be difficult to imagine anything much easier to fit, in fact the attachment would be as simple a job as any part of the assembly and the added weight is so small that it may be neglected.

Australian Imports Increase 200 Per Cent

U. S. A. Supplies Over Two-Thirds of $5,381,275 Worth of Automobile Chassis and Bodies Absorbed by Commonwealth in First 6 Months of 1916—Rubber Shipments $2,643,455

SYDNEY, AUSTRALIA, Sept. 12—Shipments of automobile chassis, bodies and rubber to Australia during the first half of 1916 show an increase of 200 per cent over those of the same period in 1915. That this country is fast coming to the fore as an automobile buying power is manifested in the latest import figures, which show a total of $5,381,275 in bodies and chassis, as compared with $2,543,595 in the first half of 1915. Rubber shipments totaled $2,643,455.

The American automobile makers have taken advantage of the excellent business conditions there and have built up a large trade with each of the Australian States. Over two-thirds of the cars shipped to Australia were from the United States, this country also leading in each of the States. New South Wales, which is the largest automobile buying state in Australia, bought nearly one-half of the cars sent from the United States to that country and increased its imports from that country nearly six-fold over those in the first half of 1915.

$4,297,360 in Chassis

Chassis shipments to the Commonwealth during the first half of 1916 amounted to $4,297,360 as compared with $2,093,740 in the same period in 1915. Of this amount, $2,781,565 was from the United States against $864,840 in the first half of 1915. With the exception of the United Kingdom and Germany, the rest of the countries showed large gains during that period. British imports dropped nearly 60 per cent, or from $587,505 to $312,300; German imports dropped from $17,460 to $1,705. Canada, France and Italy, however, marked up large gains, especially Canada, which shipped cars worth $820,130 as against $356,380. France shipped cars worth $114,675 as against $99,460. and Italy nearly doubled her shipments to that country, totaling $249,740, as against $141,880.

Body shipments were more than doubled despite the fact that this country is a very important one in the matter of body building. Body shipments totaled $1,083,915, as against $449,855 in the first half of 1915. The United States also led in these shipments, sending over bodies valued at $866,490, as compared with $236,235 in the 1915 period. Canada, France and Italy also showed substantial gains over their shipments during 1915. Canadian shipments totaled $163,430, compared with $80,310; French shipments totaled $10,580, as against $2,550; and Italian shipments totaled $10,925 as against $7,910. The United Kingdom, which did a large business of $120,240 worth in the first half of 1915, fell off considerably in 1916, her total being $31,680.

N. S. W. Absorbs Most

In both the chassis and bodies, New South Wales was the leader with $1,757,640 and $454,230, respectively. Victoria was a close second in chassis and bodies with a total of $1,169,585 and $271,955, respectively.

New South Wales is a fertile field for automobile sales. The State is prominent as a farming and pasturage district, and as a result automobiles are in demand especially by the farming element. Not only in this State, but in the whole of Australia is there prosperity. The war has benefited the Australians instead of hampering them. From the very beginning of the war the Australian Government was busy bettering trade conditions. Exports were increased by the purchase of cargo steamers, offsetting the excessive freight rates and the general difficulties in obtaining merchandise.

There is a large demand for commercial vehicles in the farming districts. The farmers are in the field for conveyances that will speed their products to the markets.

AUSTRALIAN IMPORTS OF CHASSIS AND BODIES FROM JAN 1 to JULY 1, 1915

Chassis for Automobiles, Etc.

Country of Origin	N.S.W.	Vic.	Q'land	S.A.	W.Aus.	Tas.	C'wealth
United Kingdom	252,670	148,975	53,635	71,665	41,355	18,205	587,505
Canada	89,945	92,900	54,830	57,005	42,220	19,480	356,380
Belgium	18,705	1,945	790	1,875	1,305	.....	24,620
France	29,190	50,345	4,580	12,980	2,365	.....	99,460
Germany	7,140	6,990	3,330	.....	.....	.....	17,460
Italy	72,665	54,175	3,850	9,590	160	.....	141,880
U. S. A.	289,555	95,745	327,185	70,265	76,535	5,555	864,840
Switzerland	.....	1,595	.....	.....	.....	.....	1,595
Total	759,870	453,670	489,200	113,880	165,380	43,240	2,093,740

Bodies for Automobiles, Etc.

Country of Origin	N.S.W.	Vic.	Q'land	S.A.	W.Aus.	Tas.	C'wealth
United Kingdom	52,065	26,940	14,295	12,685	10,350	4,405	120,240
Commonwealth	330	.....	.....	.....	.....	.....	330
Canada	23,095	23,265	14,175	6,120	9,510	4,145	80,310
France	1,510	100	375	420	145	.....	2,550
Germany	1,280	570	.....	.....	.....	.....	1,350
Italy	4,945	1,400	695	870	.....	.....	7,910
U. S. A.	84,455	21,215	89,800	15,300	23,840	1,625	236,235
Belgium	.....	220	160	.....	.....	.....	380
Total	167,680	73,210	119,500	35,395	43,845	10,175	449,855

AUSTRALIAN IMPORTS OF CHASSIS, BODIES AND RUBBER FROM JAN. 1 TO JULY 1, 1916

Chassis for Automobiles, Etc.

Country of Origin	N.S.W.	Vic.	Q'land	S.A.	W.Aus.	Tas.	C'wealth
United Kingdom	140,910	80,500	55,730	26,255	50,595	3,310	312,300
Canada	273,775	267,505	88,680	103,385	52,955	33,830	820,130
New Zealand	.....	.....	.....	.....	80	.....	80
Belgium	1,400	.....	.....	.....	.....	.....	1,400
France	66,715	39,960	15	7,915	70	.....	114,675
Germany	820	885	.....	.....	.....	.....	1,705
Italy	112,860	122,640	.....	14,240	.....	.....	249,740
Sweden	340	.....	.....	.....	.....	.....	340
Switzerland	4,365	45	6,015	.....	.....	.....	10,425
U. S. A.	1,255,955	658,000	438,395	294,315	197,595	37,305	2,781,565
Total	1,757,640	1,169,585	588,835	446,110	256,295	74,445	4,297,360

Bodies for Automobiles, Etc.

Country of Origin	N.S.W.	Vic.	Q'land	S.A.	W.Aus.	Tas.	C'wealth
Commonwealth	165	.....	.....	.....	.....	.....	165
United Kingdom	18,720	3,700	4,085	1,370	1,025	2,780	31,680
Canada	61,735	52,065	18,085	16,250	11,195	4,100	163,430
Belgium	450	.....	.....	.....	.....	.....	450
France	9,305	1,275	.....	.....	.....	.....	10,580
Germany	195	.....	.....	.....	.....	.....	195
Italy	6,560	4,225	.....	140	.....	.....	10,925
U. S. A.	357,100	210,690	133,830	90,150	63,620	11,100	866,490
Total	454,230	271,955	156,000	107,910	75,840	17,980	1,083,915

Rubber Manufactures, N.E.I.

Country of Origin	N.S.W.	Vic.	Q'land	S.A.	W.Aus.	Tas.	C'wealth
Commonwealth	1,325	13,405	.....	.....	.....	.....	14,730
United Kingdom	224,660	105,480	23,475	44,825	31,450	3,960	433,850
Canada	70,685	24,990	27,715	24,695	13,340	7,620	169,045
India	.....	.....	.....	.....	.....	10	10
New Zealand	.....	2,355	5	.....	.....	110	2,470
Belgium	400	.....	.....	.....	.....	.....	400
France	51,000	61,290	16,810	3,405	90	.....	132,595
Germany	415	1,020	.....	55	.....	.....	1,490
Italy	22,435	9,030	.....	2,090	560	.....	34,115
Japan	2,545	8,235	495	145	5	.....	11,425
Russia	85	5	.....	.....	10	.....	100
Sweden	20	40	20	70	.....	.....	150
Switzerland	.....	40	.....	.....	.....	.....	40
U. S. A.	1,302,530	215,670	135,580	100,160	70,160	18,935	1,843,035
Total	1,676,100	441,560	204,100	175,445	115,615	30,635	2,643,455

Gasoline from Natural Gas

75,000,000 Gal. of Casing Head Gasoline Produced in 1915—100,000,000 Gal. Is Estimate for 1917—Costs 8 Cents Per Gal.—Old Oil Wells Valuable

By Bernard N. Glick

EDITOR'S NOTE:—According to government reports the casing-head gasoline industry, or production of raw gasoline from natural gas, increased 53 per cent in 1915 over 1914, an average price of 7.9 cents per gal. being received for the unblended product. The same authority estimated that 24,000,000,000 cu. ft. of natural gas was utilized, with an average recovery of 2.57 gal. of gasoline per 1000 cu. ft. Mr. Glick has made an exhaustive study of this growing industry with a view to its possibilities as a relief to the situation caused by the ever-increasing demand for gasoline as a fuel for automobiles and motor trucks.

IN these days when rumors of scarcity of crude oil and higher prices of gasoline are general, it is overlooked by many that a new industry in the manufacture of gasoline has been developing during the last 10 years. This is the manufacture of gasoline from natural gas, the natural gas being produced along with oil from the wells from which crude is obtained.

During the year 1915, a total of 75,000,000 gal. of "casing head" gasoline, as this gasoline is named, was produced and the estimated production for this year is over 100,000,000 gal. Since this casing head gasoline is blended with about an equal volume of petroleum distillate before it is marketed as an automobile fuel, the total production of gasoline from this source will be round 200,000,000 gal.

The total production of gasoline from various sources last year was about 1,000,000,000 gal., so that this process in its relatively undeveloped state, already represents a 20 per cent factor of the total supply.

In the production of gasoline from natural gas, from 400 to 500 cu. ft. of gas are needed to produce a gallon of gasoline. At present rates the gas for manufacturing purposes sells for about 10 cents per 1000 cu. ft. With operating expenses in the neighborhood of 2.5 cents per gallon, it costs approximately 7.5 to 8 cents to produce a gallon of gasoline from natural gas. Losses by evaporation, storage and transportation charges have to be added to this but there is evidently left a wide margin of profit with gasoline at present figures.

All Gas Not Available

All grades of natural gas are not suitable for the manufacture of gasoline, in fact, only a small percentage is satisfactory. The variety used is known as "wet gas" and issues from wells along with oil. In some cases where the natural oil flow has stopped the gas is pumped out under reduced pressure, and a number of oil wells which have not been producing oil for several years have been pumped during the past year for natural gas which is eminently suited for this purpose.

Naphtha Treatment Required

The gasoline so manufactured is not used in automobiles directly as produced. It is far too volatile and before it can be so used it has to be blended with refinery naphtha of approximately equal volume. Once blended the fuel is handled just the same as refinery gasoline and is equally satisfactory in use.

The manufacture of gasoline from natural gas was started in 1904, since which time its expansion has been rapid. This industry first reached its highest development in the Appalachian fields extending through Pennsylvania, New York, Southern Ohio, West Virginia and Kentucky, but has since spread to the Middle West and Western States, and just as in the production of gasoline from crude the west has taken the lead, so has it taken the lead in the production of gasoline from natural gas.

In the manufacture of "casing head" gasoline two processes are now used, a third and very promising one being in process of development.

The first, known as the compression and condensation process, and accounting for the major part of the production, is described below.

Refrigeration Used By Few

The second, confined to a few plants, is known as the refrigeration process, cold alone being used to condense the gasoline vapors in the natural gas. The cooling agent used is ammonia, and the process is somewhat similar to the manufacture of ice from water, the heat necessary to volatilize the liquid ammonia first formed by compression being taken from the natural gas, which is thereby cooled sufficiently to deposit the gasoline vapors as a liquid.

The third process, known as the absorption process, is comparatively new, and consists in bringing natural gas into contact with some heavy oil (usually a petroleum distillate) letting this absorb the gasoline from the natural gas and then separating the gasoline from it by distillation. By this method it is possible to treat natural gas that is unsuitable for compression owing to the small percentage of gasoline vapors contained, and it promises to rival in volume of production the older compression process, when developed.

The compression process is the one by which the majority of the gasoline coming from natural gas is produced. The natural gas is compressed in a series of cylinders and after being compressed is passed through a coil of cooling pipes where it condenses and is collected in the form of gasoline. In this process there are several stages of condensation and compression. The first pump compresses to a pressure of 50 lb. after which the compressed gases are chilled in a series of pipes; the second pump compresses to a pressure of 250 lb., receiving its supply of gas from the series of pipes following the first pump. From the second pump the gases are passed into a cooling coil and liquid condensing is collected and any gas remaining passed on to another pump. An equipment for forming gasoline by this compression process will produce 300 gal. of gasoline per day and cost from $11,000 to $12,000.

The apparatus necessary for compression is neither very

Members of Standards Committee of S. A. E. and G

Top row—Henry Souther, consulting engineer, U. S. Signal Corps, Professor Daniel Roesch, W. A. Frederick, C. W. McKinley, guest, Professor R. M. Anderson, Professor C. B. Veal, R. J. Nightingale, K. W. Zimmerschied, F. S. Duesenberg

Second row—Augustus Post, H. G. Snow, E. E. Sweet, President Russell Huff, F. M. Germane, Vice-President R. H. Combs, C. M. Bunnell, guest, John R. Cautley

Third row—W. M. Britton, Quartermaster's Department, U. S. A., F. J. Jarosch, Councilor George W. Dunham, J. E. Diamond, guest, T. L. Lee, Treasurer Herbert Chase, B. B. Bachman, R. S. Lane, B. D. Gray

Bottom row—Secretary Coker F. Clarkson, S. G. Averill, consulting engineer, U. S. Signal Corps, George R. Bott, C. E. Bonnett, J. C. Manternach, C. B. Williams

extensive nor involved. Quite a number of the compression plants obtain their gas from wells quite some distance away, whence it is brought in pipe lines under reduced pressure. Some of the finest gas for compression purposes is got from wells not delivering oil, under pressures sometimes as low as 2 or 3 lb. The compression operation proper is usually performed in two stages the gas being first of all subjected to pressures varying from 20 to 50 lb. per sq. in.

While the gas is still at this pressure it is cooled by passing through 2-in. iron pipes about 100 ft. long for every 100 cu. ft. of gas passed per minute, anything condensing being retained for mixing with the final product. Usually only a little liquid is obtained at this stage, but in some cases where the gas is very rich in gasoline vapors, as much as 5 or even 10 per cent of the total yield is got here; although this latter figure is rather exceptional.

After the gas has left the cooling pipes it is led into the high-pressure cylinder and is there subjected to pressures varying from 200 to 350 lb. per square inch. The temperature during this operation rises to somewhere around 250 deg. C. (482 deg. Fahr.) and, of course, no liquefaction takes place in the cylinder as this is way above the condensation point of any of the gases involved. The compressed gas is then cooled as before by passing through pipes cooled by water.

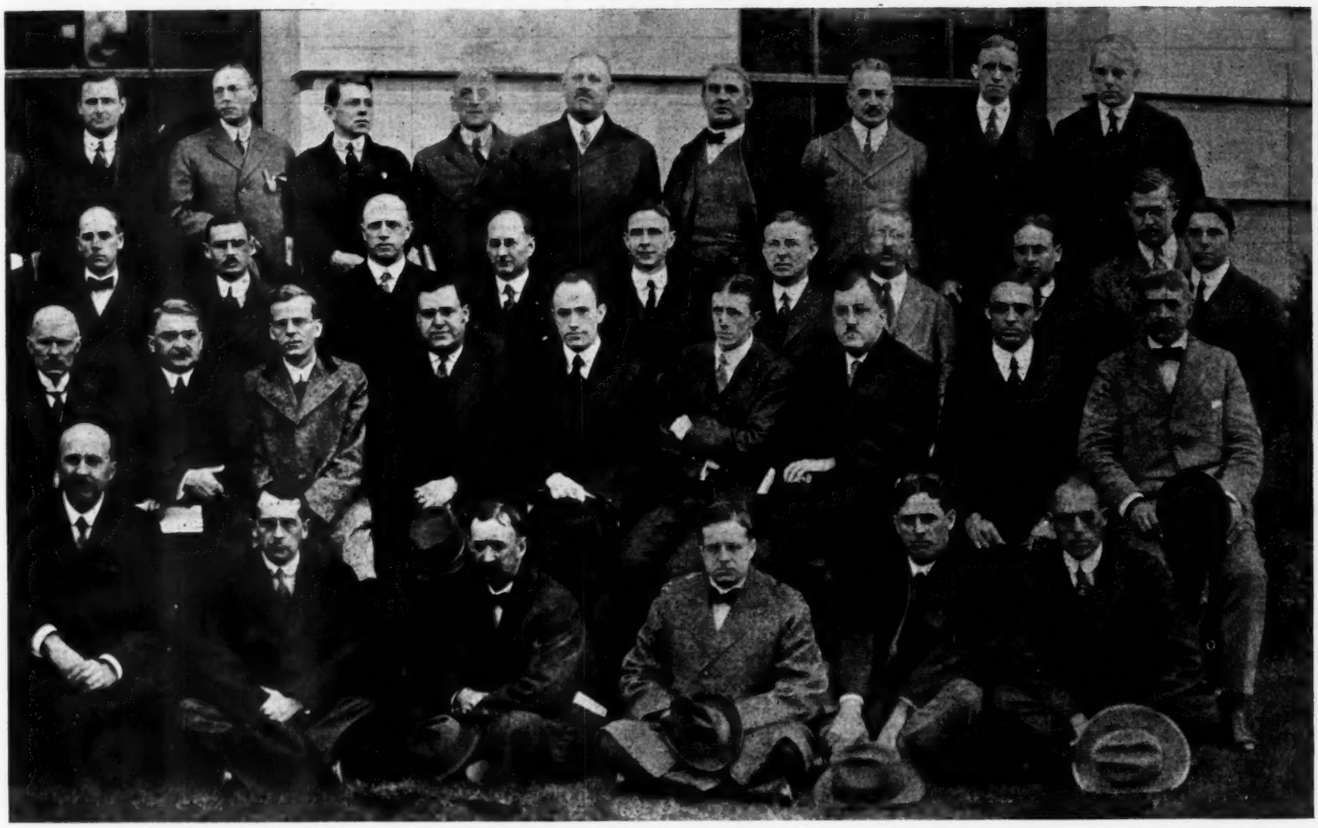
In some plants advantage is taken of the fact that when a gas is allowed to expand suddenly from high to low pressure the gas is thereby cooled considerably and this cooled gas is then circulated round the issuing gas to cool it before it also is allowed to expand, thus getting a cumulative cooling effect similar to that employed in the liquefaction of air. The most suitable pressure to use in the high-compression cylinder is usually determined by actual practice. The yield increases with increased pressure, but there is a very definite point beyond which it is inadvisable to go. If this is ignored the resulting product is known in the trade as "wild" and sometimes as high as 60 or 70 per cent of it vanishes on exposure to atmospheric conditions. Even when the pressures used in the second stage of the operation are not too high the liquid produced is still rather unstable for varying weather, storage and transportation conditions and at present practically all this condensation product is blended with refinery naphthas to obtain a more stable product still capable of use as gasoline.

These blending agents are the lower distillation products of petroleum:

Rhigolene, boiling point	18 deg. Cent.
Petroleum ether, boiling point	70-90 deg. Cent.
Naphtha, boiling point	90-120 deg. Cent.

While these petroleum distillates are not volatile enough for use in gasoline engines, by blending with the almost too volatile natural gas condensate, a stable gasoline substance

Guests at Bureau of Standards, Washington, D. C.



Top row—A. D. T. Libby, W. H. Palmer, Jr., W. H. Conant, E. H. Ehrman, H. G. Osburn, Berne Nadall, Stenographer Arthur W. Kelly, E. J. Ross, Jr., E. R. Whitney

Second row—J. E. Hale, H. D. Church, F. A. Whitten, W. R. Strickland, Professor W. T. Fishleigh, A. F. Milbrath, Robert McA. Lloyd, Professor D. L. Gallup, Councilor J. G. Utz, Recorder A. C. Woodbury

Third row—Lieut. Col. George O. Squier, charge aviation section, U. S. Army, Director S. W. Stratton, Bureau of Standards, H. J. Stagg, Jr., guest, G. Douglas Wardrop, Chairman A. Ludlow Clayden, H. L. Horning, Clarence Carson, Andrew L. Riker

Bottom row—Russell Hoopes, Charles M. Manly, W. J. Hart, Raddford Pitt, Councilor David Beecroft, L. C. Fuller

is obtained, capable of being stored and shipped in barrels and tank cars without serious loss.

In this process only about 15 per cent of the gas is removed, although in some places where exceptionally rich gas is used as high as 50 per cent or more disappears during compression, and the residual gas is still a very valuable product. Its thermal efficiency compared with the original gas is almost unimpaired, while for lighting and power purposes it is in many cases improved. With wet gases trouble is often caused in gas engines by premature ignition due to the contained gasoline vapors, and similarly, when burned in standard burners, sooty flames are produced, owing to their incomplete combustion. The wet gas really has merely been changed during the operation into a comparatively dry one, comparative only, for in plant practice all the gasoline constituents are never removed. This residual gas therefore is often turned into the ordinary gas mains or used on the least for running the engines and pumps, while some plants compress it in steel cylinders and sell the product for various purposes under the name of "gasol."

125,000 Cu. Ft. Per Day

The usual sized plant handles round 125,000 cu. ft. of gas per day which, averaging round 2.5 gal. of gas per 1000 cu. ft., will produce about 300 gal. of gasoline daily; smaller plants not having been particularly successful.

The equipment for plants handling up to about 500,000 cu. ft. of gas daily and producing about 1200 gal. of condensate will cost in the neighborhood of $8,000 to $10,000 under normal conditions, pipe lines to wells, railroad sidings, storage tanks, etc., being extra, and can be operated night and day without any undue exertion by two or three men, a plant handling up to 1,000,000 cu. ft. being easily cared for by six.

A case quoted in a government bulletin gives details of two plants costing $40,000 for complete equipment. Operating expenses, including salaries and repairs, for the year 1913 were $11,000. The two plants sold 490,000 gal. of gasoline, for most of which they received 13½ cents per gallon. Taking 11¼ cents as an average, the gross income was $55,125, the net income $44,125 or round 110 per cent on the original investment. Some idea of the value natural gas has attained may be derived from the fact that in the States of West Virginia and Pennsylvania, two of the greatest oil producers, the value of the natural gas produced in 1914 surpassed by a comfortable margin that of the crude oil.

Natural gas has long been known as one of the most efficient of fuels. It is clean, easily handled, has high calorific power and efficiency of combustion and competes very successfully with coal as a source of power. Its slight toxic effect combined with these properties renders it also particularly suitable for domestic lighting and heating, no new

Casing Head Gasoline Production Statistics for Ten States

STATE	NATURAL GAS PRODUCED			GAS USED FOR COMPRESSION PLANTS			GASOLINE PRODUCTION		
	Quantity (M. Cu. Ft.)	Avge. Value (M. Cu. Ft.)	Total Value	Quantity (M. Cu. Ft.)	Total Value	Gasoline (M. Cu. Ft.)	No. of Plants	Daily Capacity, Gal.	Quantity, Gal.
Oklahoma	78,167,414	10.30	$8,050,039	5,738,549	$273,940	3.01	58	74,793	17,277,555
West Virginia	238,740,162	14.87	35,515,329	3,005,292	172,396	3.58	121	34,460	9,278,108
California	17,828,928	16.33	2,910,784	5,129,709	197,066	1.48	19	32,360	7,581,309
Pennsylvania	108,494,387	18.80	20,401,295	1,560,064	125,690	2.89	119	21,456	4,611,738
Ohio	68,270,174	21.48	14,667,790	852,277	68,935	2.86	47	9,319	2,440,171
Illinois	3,547,841	12.32	437,275	462,321	43,017	2.52	14	5,300	1,164,178
Kansas	22,627,507	14.76	3,340,025				3		
New York	8,935,187	29.10	2,600,352	146,345	8,862	2.03	3	1,665	299,573
Colorado	Not	available					2		
Kentucky	1,421,818	34.52	490,875				0		
	591,866,733	19.16	88,413,764	16,894,557	889,906	2.43	386	179,353	42,652,632

fact, for it is said the ancient records of China and Japan contain many allusions to its use for these purposes. Its value as such, however, has always been restricted by an area that could be conveniently covered by pipe line transportation from central compression stations, and this has certainly helped to keep its properties and uses of merely local importance.

Occurs in Oil Fields

The gas occurs in most of the States where oil is found, sometimes along with the oil, but often entirely separate from it. Where the two occur together it is still unfortunately the custom to waste the gas, especially in large scale operations, owing to the desire to produce and market the more easily accessible oil as soon as possible. When the well is first opened the quantity of gas that is allowed to escape is enormous, often reaching 10,000,000 to 15,000,000 cu. ft., a custom doubtless responsible for the premature ending of what might be otherwise productive gas fields. It is an eminently uneconomical method of exploitation in the long run, for while the reduction of pressure caused by this blow off of gas may cause a greater initial flow of oil from the surrounding strata into the well, there is little doubt that the lessening of the expulsive force that follows results in a shorter productive life. Were the gas retained in the oil-bearing strata the pressure it exerts would keep the well producing naturally much longer and also stave off the inflowing of water or brine usually occurring along with the oil.

Some idea of the extent to which this industry has attained can be got from the following figures gleaned from various government reports. The value of the natural gas consumed in the States, excluding the millions of cubic feet that simply come to the surface and escape having served no useful purpose, has increased 500 per cent in the last 15 years.

Year	Value	Year	Value
1899	$20,000,000	1913	$88,000,000
1905	40,000,000	1914	94,000,000
1912	84,000,000	1915	100,000,000

This rise has been due in a large measure to increased production, helped along by increasing prices since 1906. Of this gas only a small percentage is available for use in the production of gasoline, most of it being "dry." In 1914 with a total consumption of 592,000,000,000 cu. ft. only 17,000,000,000 cu. ft., or about 3 per cent, was utilized in the production of gasoline. The prices obtained for this gas varied according to its use, about 34 per cent or 203,000,000,000 cu. ft. being utilized for domestic purposes at an average cost of 28.04 cents per 1000 cu. ft. and the remainder for industrial purposes round 9.56 cents. The number of condensation plants, their capacity and production, has gone up in leaps and bounds as is eloquently shown by the following table:

Year	Plants	Daily Capacity, Gallons	Gasoline Production, Gallons
1911	176	37,100	7,500,000
1912	250	61,268	12,000,000
1913	351	152,415	24,000,000
1914	386	179,353	42,500,000

The price obtained for this gasoline was in the neighborhood of 10 cents per gallon, those doing their own blending realizing up to 12 and 15 cents. By States the complete statistics relating to the condensation and compression for the year 1914, the latest available, are summarized above.

(*To Be Continued*)

1916 Output To Be 98,000 Trucks

(*Continued from page* 745)

and accessories were among the most difficult articles to obtain, and some companies were seriously upset by the fluctuating and irregular quantities available. Another difficulty was in obtaining trailers, which were in much greater demand during the past year than ever before, and still another factor which made things harder for the truck makers was the freight car shortage and its attendant worries as to delivery.

180,000 Trucks in Use

As for the number of trucks in use, although no accurate statistics are available for all the States, it is significant that on July 1 there were 71,000 motor trucks in use in only seventeen States, not including such important centers as Illinois, Michigan, Minnesota, California, Connecticut, etc. This makes a striking comparison with the total of 23,855 registered in all the States at the end of 1911. A conservative estimate would place the total number of motor trucks in use in the entire country at the present time at close to 180,000, this figure not including the various types of converted passenger cars and similar makeshifts.

Domestic Demand Much Larger

Altogether, the developments of the past year indicate that the motor truck industry has made another enormous stride forward and that although the war orders have been large and remunerative, the domestic demand has grown in a way that completely overshadows export business.

Three years ago the truck industry needed a period of general good business, a period when the business men of America had money in their pockets and were willing to try something new. That period came with the beginning of 1915 and the industry leaped forward to take advantage of its opportunity.

Steam Cars, Past and Present

Modern Vehicle Vastly Better than Old Types—Causes of Trouble Eliminated from Modern Steam Cars*

By Abner Doble

THE Stanley steam car has been consistently manufactured since 1898 without cessation. The Stanley Bros. have maintained a production of about 600 cars a year, without paid advertising of any description, although they have very recently started a campaign. Their sales force has always been very meager, largely because people interested in steam cars simply went and bought them.

The evolution of their car has been gradual and conservative and Stanley cars have enjoyed a well merited reputation for service at low cost. They have used a fire-tube boiler and locomotive-type engine from the very first, and were not led astray by such faddish brain storms as single acting engines and red hot steam, which served to kill off such a large percentage of early builders. Improvements were added only when there was a well recognized demand from their customers. They have thus accumulated those necessities of modern motor cars, such as dynamo, electric lights, streamline bodies and one-man top, including a condenser, which they adapted to their car in 1914, and which allows about 200 miles' run on one filling. They now burn kerosene in the main burner (with gasoline for starting and for the pilot), and secure a very large mileage per gallon.

The fusible plug and its terrors were abandoned in favor of a thermostat for shutting off the fuel in case the driver ran short of water. Altogether the Stanley car has proved a very remarkable exception to regular automobile production.

Increased Water Mileage

One great disadvantage that steam cars labored under was insufficient mileage on the amount of water which could be conveniently carried. This was accompanied by the emission of good sized clouds of steam, and necessitated considerable searching at inopportune times for a further supply. Several steam cars were equipped with an apparatus intended to condense the steam, but a continuous run of a hundred miles without refilling was exceptional. Due to the use of heavy cylinder oil, these condensers as well as the water tank required periodical cleaning, which was an exceedingly distasteful job. Steam cars not so equipped would run approximately 30 to 35 miles on a tankful, about 35 to 40 gal. In order to handle such large quantities of water, a steam syphon was used to fill the tank.

On making our preliminary investigations we found that no one apparently had considered using a honeycomb radiator, which would, in the same size, give approximately six times as much radiating surface. The reasons advanced against this use were that the thick oil was liable to clog the extremely small passages, and that the exhaust steam (particularly in cars with flash boilers) was liable to melt the solder. We also found a superstition to the effect that oil would injure the boiler and cause violent foaming. It was also believed that the successful lubrication of a steam engine required a heavy oil with a molasses-like behavior. It was particularly hard to reconcile these beliefs, and we determined that the best thing to do was to put a honeycomb radiator onto a car and operate it in conjunction with a fire-tube boiler. This we succeeded in doing late in 1913, and realized several startling results. The car would run anywhere from 1000 to 1500 miles on one supply of 24 gal. of water. The boiler in its operation was entirely oblivious to the fact that all of the oil used by the engine cylinder was pumped into it. Having established with absolute certainty that it was possible to travel an adequate distance on one supply of water, we turned to the study of the steam-generator, with special regard to its operation when fed with water containing oil, graphite, and in winter, alcohol.

Defects of Flash Boiler

The so-called flash boiler, comprised of a series of coils forming, in effect, one continuous tube, was naturally out of it, as its entire absence of steaming stability was a source of constant aggravation to a driver in a hilly country. However, it had the immense advantage that the direction of the water-flow was opposite to the flow of the gases of combustion, which placed the coolest water in position to take the last possible B.t.u. out of the flue gases. Its all steel construction with the consequent immunity from leaks due to low water was also a great advantage. These were worth having, so we marked them down on our specification of the perfect boiler.

The vertical fire-tube boiler was also out of the question for production, on account of its great weight, potential danger present with a large diameter shell, the high cost due to the apparent necessity for winding the shell with a mile of piano wire, liability to leaks from oil working through the expanded joints where the tubes are fastened into the heads, and to overheating with low water. Notwithstanding these formidable disadvantages, it was the nicest boiler from the driver's standpoint when in good condition, due to its large reserve of water heated to the steam temperature, which admitted of a perfectly terrifying acceleration, and gave a feeling of absolutely unlimited power. It was also the most efficient boiler due to the regular close arrangement of the heating surface with extremely short distance through which the gases radiated their heat to the tubes. These advantages were therefore added to our specification.

The water-tube boiler, which has been built in almost every conceivable shape for motor vehicle service, had a black eye, and yet seemed to offer a basis on which the good characteristics of the flash and water level types of boilers might be combined. This at first seemed a very forlorn hope, as the maze of apparently conflicting conditions seemed unreconcilable.

Deposits of scale occurred in every type of boiler, with a resultant drop in efficiency and added liability of burning the already highly stressed heating surface.

In the water-level types of boilers, this scale would settle particularly in non-circulating portions of the boiler, such as the water column, and blow-off connections. This condition was the cause of most of the little bothers which beset the steam-car user.

In studying the apparently conflicting phases of this situation, we could see that every function was closely re-

*Paper read before Cleveland Section S. A. E.

lated to all others. That is, a water-level type of boiler held the temperature of the medium practically constant, with no possibility of temperatures high enough to effect a deleterious change in the lubricating oil. This allowed the continuous re-use of the oil. It also allowed the use of a soldered radiator to condense the exhaust steam. The honeycomb radiator condenses such a large portion of the exhaust steam, that very little make-up water is required, with the result that much less scale is introduced into the system. Since very little medium is lost, especially in winter, alcohol can readily be used in large enough proportions to keep the car from freezing up. The use of a mixture of alcohol and water results in an imperceptible drop in power due to the large amount of heat carrying medium that must be circulated. By using regular gasoline engine cylinder oil for the lubrication of those parts in contact with the steam, we were able to make a steam generating and condensing system of this kind practical. First, it is more agreeable to handle and easier to procure than heavy steam oil. After it is introduced into the circulating medium, it rapidly goes into an emulsion with the water, due to the violent agitation and intimate contact. It cannot form clots and clog up the radiator passages, and since the return from the radiator is introduced into the bottom of the water-tank, the agitation of the contents of the tank is sufficient to maintain the emulsion. This insures that the oil is regularly pumped into the boiler along with the water. The oil that thus finds its way into the boiler performs several valuable functions. First, it thoroughly coats every portion of the interior of the boiler with an exceedingly thin coating of oil. While this coating is extremely thin at ordinary temperatures, it is very much thinner at 485 degrees Fahr., which is the approximate temperature of the boiler at 600 lb. pressure.

Scale Cannot Stick

No scale will stick to a surface coated with oil, so that the interior of the boiler is absolutely protected from accumulations of scale as well as from rusting. Although there is very little scale bearing water introduced into the system due to the efficient condenser, in several years' operation, there would be an accumulation of the scale formed large enough to render a boiler useless, even though no scale adhered to the tubes. The second function of the oil in the water is to combat this condition, which it does with thoroughness and dispatch. As soon as a particle of scale material is thrown out of solution it is thoroughly coated with oil, which renders it incapable of sticking to any other particle of scale material. This scale, therefore, remains in suspension, and due to the violent ebullition and constant flow of the medium toward the steam outlet, is carried along and out with the steam, finally ending up in the water-tank. This action appears to be exceedingly thorough, and in several years' use no accumulation of scale can be detected in any portion of the boiler.

The steam generator, which has been worked out to fulfill these inter-related conditions, is a flash-generator in theory, and yet has the appearance of a water-tube boiler and carries a water-level in the evaporating zone. The close regular heating surfaces duplicate the heat transference conditions of a fire-tube boiler, and yet the progressive water flow, counter to the flow of the gases, with no circulatory flow, is true of the flash type. The water enters the bottom of the economizer-zone, and flows to the top under the action of the pumps, and gravity, which means that the hottest water collects at the top. From here the water overflows through a connecting pipe into the evaporating-zone, where it is converted into steam. The water level is maintained about half way up the generator by means of an automatic by-pass valve, so arranged that when the regulator tube is filled with steam and consequently hot, the by-pass valve is closed by the expansion of this tube, forcing the water from the pumps to lift the check valve and enter the generator. As the water level rises, the regulator tube is filled with water from an exposed pipe leading from the water manifold. This water is not in circulation in the generator, and, therefore, remains quite cool. The regulator tube contracts, opening the by-pass valve, allowing the water to return to the tank.

Perhaps the greatest disadvantage of steam cars was that known as "firing up," or getting the burner started to raise steam. After a fairly discouraging series of experiments, we discovered that kerosene could be ignited by an electric-spark with absolute certainty and regularity if certain conditions were observed. These conditions were: First, the kerosene must be broken down mechanically so that the individual particles are sufficiently small to insure a rise in temperature past the point of ignition in the time element during which they absorb heat from the spark. Second, the spark must occur near the atomizing nozzle where the fog is dense enough, so that one group of kerosene particles igniting would invariably ignite the rest before being consumed. Third, the velocity must be sufficiently low so that the particles have time enough to absorb sufficient heat from the spark to pass the igniting temperature. Fourth, the mixture must be very much richer at the place where ignition is to occur than the best mixture for efficient combustion.

In connection with the mixing and igniting apparatus, it is necessary that the combustion shall occur in a refractory chamber so arranged that it attains a very high temperature. The intensely hot chamber gives an ideal thermal condition, and complete combustion of a large amount of fuel can be obtained in a very small space.

Thus, in the complete apparatus, we have an electric-motor, direct connected to a multivane blower, and a graduated kerosene pump. The kerosene pump draws a measured quantity of fuel from the supply tank and forces it through the atomizing nozzle; the resultant fog is ignited by a spark plug. A measured amount of air is forced in by the multivane blower, which whirls this rich ignited mixture down through an inlet tube against the bottom of the refractory combustion chamber, where the fuel is consumed. To stop the combustion it is only necessary to break the blower-motor circuit. This is done automatically by means of a regulator set to operate at a pre-determined steam pressure.

Having thus reviewed the situation, and having described what specific mechanism has been designed (and tested) with a view to bringing the steam power plant as near perfection as possible, it might be well to consider what advantages may be rightly expected with a perfected steam power plant, and to compare the operation of the present day gasoline car.

Steam Car Qualities

1. 100 per cent torque range, with maximum torque available at zero speed, thus making superfluous change gear mechanisms and clutch. The M. E. P. (and its equivalent D. B. P.) always under control of the operator, and variable by means of the throttle from zero to maximum, a maximum which is limited only by the tractive capacity of the driving wheels.

2. Utmost mechanical simplicity, with not over 25 moving parts in the entire car, and only 15 in the engine.

3. Perfectly smooth and quiet, due to very low engine speed with one to one ratio, and to location of engine on axle.

4. Low running cost due to use of kerosene or crude oil for fuel.

5. Low manufacturing cost due to simplicity—to lack of fussy work in production.

6. High thermal efficiency, which should be at least twice the efficiency of an internal combustion engine at ordinary driving speeds. As the maximum performance of automobiles is pushed higher, the greater will be the advantage of the steam plant under everyday operation.

7. Entire absence of lubrication troubles, since no contamination of the crank-case oil, by kerosene, gasoline, water, road-dust, and carbon, can take place. The internal lubrication of cylinders, etc., is mostly accomplished by the water in the steam.

Industrial Miscellany

Factory

McIntyre Manufacturing Co., Columbus, Ohio, maker of the Farm Boy Tractor, has received an order for three tractors to be shipped to London, Eng., at once. Other orders from abroad are in prospect. In fact, business is so good that the present plant, located at 172 West Locust Street, is too small and the company is casting about for a location to erect a larger plant.

Xcell Manufacturing Co., located at 321 Mount Vernon Avenue, Columbus, Ohio, manufactures a device for the raising and lowering of Ford tops.

Crow Motor Co.'s plant, Elkhart, Ind., is being enlarged with a two-story addition, 125 by 60 ft. The addition is made necessary by the increased business of the company. The trimming and body departments will be located in the new building.

Elgin Motor Car Co., Chicago, Ill., is planning an addition to cost $75,000.

Perlman Rim Co., Jackson, Mich., is building an addition, 100 by 440 ft., and another, 80 by 380 ft., in addition to a former enlargement earlier in the season.

Simplex Automobile Co., New Brunswick, N. J., is planning the erection of a new plant for the manufacture of automobile bodies. A new factory for the manufacture of aeroplanes is also under consideration.

Goodyear Tire & Rubber Co. factory staff met the managers of the Southeastern District and their salesmen in Atlanta, Ga., recently for a 3 days' convention. All phases of the business of the past year and plans for the future were discussed. During the meeting it was announced that J. E. Taylor, sales-manager of the Atlanta branch, had been promoted to a place in a new department of sales promotion at the factory. Mr. Taylor had been in Atlanta 4 years and Charlotte, N. C., 3 years in Goodyear service.

Columbus Auto Parts Co., Columbus, Ohio, is doing a large business in automobile hardware, which is its specialty. Included in the list are wind-shields, robe brackets, foot rests, hub caps and other accessories. The company has recently booked large orders from automobile factories. C. J. Krag is president and R. E. Klager, secretary-treasurer.

C. A. S. Products Co., Columbus, Ohio, which manufactures gears, has booked an order for $75,000 worth of gears from a Cleveland automobile plant. This order, with others already on the books, will keep the plant busy for the coming year. The concern now employs 130 men. The plant is too small for the development of the business and an effort is being made by Adrian, Mich., to have the plant removed to that city.

Auto Cushion Fender Co., Columbus, Ohio, which was recently reorganized from the Welton Fender Co., is progressing nicely at its new place of business, the Columbus Auto Brass Co. Two sizes of fenders are now being manufactured. Dr. John M. Thomas is president; Dr. Fred Fletcher, secretary-treasurer, and J. W. Howe, general manager.

Personal

C. F. Barth has been appointed works manager for the C. F. Wilson Body Co., Detroit, Mich. Mr. Barth was formerly the factory and production manager for the Murphy Chair Co.

Willis Hollingsworth, South Bend, Ind., who has been connected with the Overland company, sailed Oct. 21 on the St. Paul, for London, where he will become instructor mechanic for the Overland company of Great Britain.

J. H. Guy, his wife, and Master Arthur Guy, of Laporte, Ind., were passengers of the Alaunia, of the Cunard line, which left New York for Falmouth and London, and struck a mine in the English Channel Oct. 19 and sunk. Mr. Guy was formerly vice-president of the Advance-Rumely Co. of Laporte, and resigned recently from the office. They were rescued from the steamer.

P. J. Wood has become sales manager of the Montreal, Que., branch of the McLaughlin Motor Car Co. Mr. Wood succeeds the late C. M. Bennett, and has been for many years with the McLaughlin company, previous to which he was connected with the Pope-Hartford Motor Car Co. of Canada.

Joseph Livingston, formerly assistant branch manager of the Studebaker Corp., at Omaha, Neb., has become manager of the Cleveland branch of the Maxwell company.

T. W. Warner, formerly with the Warner Mfg. Co., is manager of the Chevrolet Motor Co., Toledo.

E. L. Baker, Indianapolis, has been appointed president and general manager of the recently organized New Madison Sales Co., which will distribute Madison Sixes in Indiana. The Madison Motors Co., Anderson, Ind., recently was reincorporated with a capitalization of $2,000,000.

W. J. Hearn, head of the Hearn Tire & Rubber Co., dealer in automobile tires of Columbus, died suddenly of acute indigestion at the age of 52 years.

The Automobile Calendar

ASSOCIATIONS

Nov. 22—Boston, Mass., National Assn. of Automobile and Accessory Jobbers' Meeting.

Dec. 2-9—Electricians' Country-wide Celebration.

Jan. 9—New York City, National Automobile Chamber of Commerce, Annual Banquet at Waldorf-Astoria.

Jan. 9-11—New York City, Society of Automobile Engineers Mid-Winter meeting, Thursday, Jan. 11, S. A. E. day. Annual Banquet, Hotel Biltmore, Special performance Ziegfeld's Midnight Follies.

CONTESTS

Nov. 16 and 18—Santa Monica, Cal., Vanderbilt Cup and Grand Prix Races.

Nov. 18—Phoenix, Ariz., 100-mile free-for-all Track Race. Arizona State Fair.

Nov. 24 and 25—Newark, N. J., 24-Hr. Endurance Run of N. J. Automobile and Motor Club.

Nov. 30—Uniontown, Pa., Speedway Race.

Nov. 30—Los Angeles, Cal., Ascot Speedway 200-mile Championship Race.

1917

April—Los Angeles to Salt Lake City Road Race.

May 19—New York Metropolitan Race on Sheepshead Bay Speedway.

May 30—Indianapolis Speedway Race, Championship.

June 9—Chicago, Ill., Speedway Race, Championship.

June 23—Cincinnati, Ohio, Speedway Race.

July 4—Omaha, Neb., Speedway Race, Championship.

July 14—Des Moines, Iowa, Speedway Race, Championship.

July 28—Tacoma, Wash., Speedway Race, Championship.

Aug. 4—Kansas City Speedway Race.

Sept. 3—Cincinnati, Ohio, Speedway Race, Championship.

Sept. 15—Providence, R. I., Speedway Race, Championship.

Sept. 29—New York, Speedway Race, Championship.

Oct. 6—Kansas City Speedway Race.

Oct. 13—Chicago Speedway Race.

Oct. 27—New York Speedway Race.

SHOWS

Nov. 10-18—Providence, R. I., Show, Rhode Island Automobile Dealers' Assn.

Nov. 20-25—Worcester, Mass., Show, Worcester Casino; Worcester Automobile Dealers' Assn.

Dec. 2-9—Springfield, Mass., Show, Auditorium. H. W. Stacey, Mgr.

Dec. 30-Jan. 6—Cleveland, Ohio, Sixteenth Annual Show, Wigmore Coliseum, Cleveland Automobile Club.

Jan.—First Pan-American Aeronautic Exposition, New York City; Aero Club of America, American Society of Aeronautic Engineers, Pan-American Aeronautic Federations.

Jan. 6-13—New York City, Show, Grand Central Palace, National Automobile Chamber of Commerce.

Jan. 9-10—Fort Dodge, Ia., State Convention, Iowa Retail Automobile Dealers' Assn.

Jan. 20-27—Detroit, Mich., 16th Annual Show, Detroit Automobile Dealers' Assn.

Jan. 22-27—Rochester, N. Y., Show, Exposition Park, Rochester Auto Trades Assn.

Jan. 27-Feb. 3, 1917—Chicago, Ill., Show, Coliseum, National Automobile Chamber of Commerce.

Jan. 20-27—Montreal, Que., Automobile Trade Assn.

Feb.—Newark, N. J., Show, First Regiment Armory.

Feb. 3-10—Minneapolis, Minn., Show, Minneapolis Automobile Trade Assn.

Feb. 10-18—San Francisco, Cal., Pacific Automobile Show, G. A. Wahlgreen, Mgr.

Feb. 18-25—St. Louis, Mo., Show, Auto Manufacturers' and Dealers' Assn.

Feb. 19—Pittsfield, Mass., Show, Armory. J. J. Callahan, Mgr.

Feb. 19-24—Syracuse, N. Y., Show, State Armory, Syracuse Dealers' Assn.

Feb. 26-March 3—Omaha, Neb., Show; Auditorium, Omaha Automobile Show Assn.

March 6-10—Boston, Mass., Show, Mechanics' Bldg., Boston Automobile Dealers' Assn.

March 6-10—Ft. Dodge, Iowa, Northern Iowa Show, New Terminal Warehouse, G. W. Tremain, Secretary.

March 14-17—Davenport, Ia., Show, Coliseum Bldg., Tri-City Automobile Trade

M. L. Gallagher has been named as manager of the J. Mann Motor Co., Spokane, Wash., Studebaker distributor.

George L. Trotter Co., Seattle agent for the Stearns-Knight, Reo, and Stewart trucks, will soon erect a building near the corner of Bellvue and E. Pine Street, which will be of reinforced-concrete and brick construction, two stories high, and 50 by 107 ft. in dimensions.

B. E. Scearce, assistant manager of the Seattle branch of the Motor Car Co., has been appointed factory representative for the company in charge of the Montana territory. He will be succeeded by William Bradshaw.

A. J. Shorrock has been appointed manager of the Auto Tire & Rubber Co., Seattle.

W. A. Wallace has taken the agency for the Ford car in the E. Pike Street district of Seattle, Wash.

Harry Gowdy, better known as "Hank," the hero of the 1914 world's baseball series when with the Boston Braves, has taken a position as salesman with the Campbell-Gilchrist Sales Co., 15-17 North Fourth Street, agent for the Empire and Pennsylvania tires.

E. M. Dalley, proprietor of the Paige Motor Car Co. at New York, has bought an interest in the agency at Boston and the company there has been reorganized as a result. At first it was believed that the New York Paige agency would absorb the New England one. A new company has been formed now with Sherwood Hall, Jr., who has handled the car at Boston for some years as president, but Mr. Dalley is treasurer. W. B. Hennigan is sales manager. The company will occupy a new building that is to be erected at the corner of Commonwealth Avenue and Beacon Street.

H. F. Reid has become a stockholder and been appointed purchasing agent of the Fen Far Co., Cleveland. He has severed his connection with the M. & M. Co., Cleveland.

A. L. Edwards has been made manager of the Detroit branch of the Kelly-Springfield Tire Co. He is a son of G. D. Edwards, who died recently, and was manager up to the time of his death.

G. F. Weaver, formerly branch manager for the Jeffery in Cleveland, and later sales manager of the Philadelphia agency, has been appointed manager of the J. Harry Schumacker Co., which handles the Dorris and Moon cars in this city.

Dealer

Hainsworth Motor Co. has opened a branch in Tacoma, Wash., where the Oldsmobile will be sold under the management of A. B. De Castellane.

E. M. Lang has taken the agency for the Maxwell, Oakland and Chalmers cars at Auburn, Wash.

Knight Tire & Rubber Co. has closed its Seattle branch, and its products will be handled locally by the Pacific Tire & Rubber Co. in the future.

Mitchell Motor & Service Co., Seattle, have been appointed distributors of the Hal. Twelve in western Washington.

McNatt & Ferguson have taken the agency in the state of Washington for

H. Johnson has purchased the Commercial Auto Co., Tacoma, and has appointed Arthur Contay as chief of the mechanical department.

the Sun Light Six. They will have salesrooms at North Yakima, Seattle and Spokane.

Seven-Seven Co., distributor of Dodge cars in Spokane, Wash., has contracted to handle the Kissel line in Spokane and the Inland Empire.

Siler Auto Co., Spokane, Wash., has taken the agency in the Inland Empire for the Allen.

Maxwell Motor Sales Corp., Philadelphia, has located in its new service station at Twenty-second and Spring Garden Streets, formerly the Park Garage.

Buick Motor Co., Philadelphia, recently moved into its new building and service station at Broad and Poplar Streets.

John G. Wollaeger Co., 417-421 Wells Street, Milwaukee, Studebaker distributor for Wisconsin, has been appointed Milwaukee dealer for the Peerless Eight.

Calumet Garage Co., Calumet, Mich., has been appointed dealer in Jordan and Liberty cars.

F. D. Halferty, Antigo, Wis., is a new Dodge Bros. dealer for Langlade County.

Pathfinder Sales Co., 163 Eleventh Street, Milwaukee, has been appointed state distributor of Empire cars.

Wallace C. Hood, president of the Wallace C. Hood Service Bureau, Detroit, has enlarged his office space in the Dime Bank Building.

St. Louis Battery Co., St. Louis, has opened a sales and service station for Ever-Ready batteries at 3215 Locust Street.

Efficiency Oil Co., St. Louis, announces a service station for Mileometer tape at 3213 Locust Street.

Springfield Body Co. has opened a New York service station at 22 West Sixty-first Street. Chas. Baasch, formerly located at the factory in Springfield, Mass., is manager of the station.

KisselKar will for the first time be represented in Detroit by the George W. Franklin Co., 698-700 Woodward Avenue.

McCurdy-Brainard Co., Philadelphia, has been formed and will handle the Jordan car in Pennsylvania, New Jersey and Delaware. The company is headed by R. P. McCurdy, formerly Pierce-Arrow agent in Pittsburgh.

The Hudson-Stuyvesant Co., Cleveland, plans to erect a $500,000 plant devoted entirely to the sale of Hudson cars in Cleveland.

Gomery-Schwartz Co., Philadelphia distributor of the Hudson, has awarded the contract for the erection of a ten-story concrete building at Broad and Cherry Streets, costing about $400,000. The building will measure 137 by 180 ft.

O'Meara-Green Motor Co., Denver, has opened a Ford agency and service station at 1439 Cleveland Place.

Southwest Motor Co., Kansas City, Mo., has employed C. C. Tanner, formerly with the Halladay Motor Co., St. Joseph, Mo., as district manager for the Reo in Kansas and Missouri. C. B. Haycox, formerly district manager of the Velie Motor Car Co., Oklahoma City, and E. B. Baxter, formerly with the Buick and Studebaker companies of this city, have been added to the force.

Ebbeler Motor Car Co., St. Louis, distributor of Mitchell cars, has added the Metz for Missouri, southern Illinois and northern Kentucky.

Hathaway Motor Co., Kansas City, Mo., has taken on the Monroe and the Oldsmobile.

Buick Motor Co. has discontinued the sale of cars at retail in Milwaukee. The West Side Buick Co. will be Buick distributors under E. M. Jordan, formerly connected with the Buick Motor Co.

Fisk Tire Co., St. Paul, has moved to new quarters at 179 West Sixth Street with service station for forty cars at 402-404 North Exchange Street.

St. Paul Chandler Co. and White Auto Co. have opened new quarters at Sixth and Seventh Streets.

Detroit Electric Car Co., St. Paul, has begun erecting a sales and service station at Grand Avenue and Milton Street.

Elgin Motor Sales Co., Minneapolis, has been incorporated at $20,000 by H. S. Baker and R. G. Rowland of Minneapolis and G. S. Bannon of St. Paul.

Carlson Motor Car Co., Minneapolis, has been incorporated at $50,000. It will handle Kisselkar in the Northwest. W. T. Carlson is president and manager.

Wayne Oil Tank & Pump Supply Co., Davenport, Iowa, has purchased a lot on Seventeenth Street, near Second, in Rock Island, Ill., and will erect an oil service station of brick, one story in height. It has been decided to establish a series of these independent oil stations in the leading cities of the Middle West in order to take care of the automobile trade.

Bosch Magneto Co. has purchased a large plot of ground in Chicago upon which it will build a new and enlarged branch building. The erection of a new building has been rendered necessary largely by the big increase in general business of the Middle Western section. The present location, which is at Michigan Avenue and 24th Street, having an area of 6000 sq. ft., will be vacated about Dec. 1 for the new branch building located on the corner of Michigan Avenue and 37th Place, a location somewhat further south on Michigan Avenue and about midway between the old and new automobile districts. The spare parts, sales and repair departments will be on the main floor, as well as the stock room, the disassembling, washing and testing department, packing department and installation departments. The second floor will house the reception room, manager's office and trade department, as well as the superintendent's office, general office, financial department and drafting room.

Detroit Lubricator Co., Detroit, has issued a new folder descriptive of the latest Stewart carburetor installation for Ford cars.

Stearns Motor Car Co., St. Louis, has been reorganized to handle the Stearns-Knight car. The company will be reincorporated with G. B. Self, Howard L. Austin and A. L. Walsh as chief stockholders. A show room, 40 by 75, with a service room in the rear, has been leased in the Missouri Life Building at 1507 Locust Street.

Lackawanna Automobile Co., Packard, Chalmers and Saxon dealer, has let a contract for the erection of a five-story sales and service building at Vine and Wyoming Streets, Scranton, Pa. The building will have a floor space of 40,000 sq. ft. and will be ready for occupancy in March.

Elcar Motor Sales Co., Indiana distributor for the Elcar, last week closed a lease for two automobile display rooms being erected at 327 North Capitol Avenue, Indianapolis.